SB0528_2022_GRID-Alternatives-Mid-Atlantic-Alexand
Uploaded by: Alexandra Wyatt
Position: FAV

Maryland General Assembly
House Economic Matters Committee
February 15, 2022

Testimony of Alexandra Wyatt
Policy Director and Legal Counsel
GRID Alternatives

SB 528, Climate Solutions Now Act of 2022
Sponsors: Senators Pinsky, Ferguson, Kelley, Guzzone, Smith, Kagan, Waldstreicher, Lam, Washington, Patterson, Hester, Ellis, Zucker, Kramer, Hettleman, Young, Sydnor, Hayes, Watson, Beidle, Carter, Augustine, Elfreth, Feldman, Jackson, King, and Lee

Position: FAVORABLE

Thank you for the opportunity to provide testimony on SB 528, the Climate Solutions Now Act of 2022. My name is Alexandra Wyatt and I am Policy Director and Legal Counsel for GRID Alternatives, the nation's largest nonprofit solar installer. Our regional affiliate GRID Alternatives Mid-Atlantic (GRID Mid-Atlantic) operates in Maryland, Virginia, and the District of Columbia, providing solar job training and no-cost solar installations to underserved and low-income customers. GRID Mid-Atlantic offers these comments in support of SB 528 and requests a **favorable** report in committee. We also suggest targeted amendments that could make the legislation even stronger and more equity-focused.

GRID Mid-Atlantic's Experience Providing Equitable Climate Solutions

GRID Mid-Atlantic's mission is to build community-powered solutions to advance economic, environmental, and climate justice through renewable energy. GRID Mid-Atlantic began operations in 2014 and serves Maryland, Virginia, and the District of Columbia with single-family rooftop, multifamily affordable housing, and community solar installations. By bringing together community partners, local volunteers, and job trainees to implement solar power and energy efficiency for local residents, GRID Mid-Atlantic has completed more than 350 solar electric systems in the region, saving more than a thousand low-income households over $17 million in lifetime electricity costs.

At GRID Mid-Atlantic, we believe in creating a rapid, equitable transition to clean energy that includes everyone. GRID Mid-Atlantic works with unemployed and underemployed residents of low-income and underserved communities to overcome barriers to employment in the growing solar energy industry. To date, GRID Mid-Atlantic has provided more than 950 people in the region with hands-on solar training. GRID Mid-Atlantic's work has included successfully implementing the Solar Works DC Training Program, which is a Solar for All program of the District of Columbia's Department of Energy and Environment (DOEE) and Department of Employment Services (DOES) for hands-on solar job training and solar

installation for qualified low-income District residents.[1] GRID Mid-Atlantic also hosts fellows through the national SolarCorps Fellowship Program, supported by AmeriCorps and corporate and foundation support. SolarCorps fellows join GRID Mid-Atlantic for paid, eleven-month terms in a variety of installation, outreach, program implementation, and workforce development roles.

Communities Disproportionately Affected by Climate Change

While GRID Mid-Atlantic strongly supports the development of a methodology for identifying communities disproportionately affected by climate change (section 1-702), we are concerned that "community" is defined in an exclusively geographic way. However, places are not people, and individuals and households may be disproportionately affected even if they live outside the physical boundaries of a particular defined area such as a Census tract. Our society structurally disadvantages people on the basis of income, disability, gender, race, ethnicity, language, prior incarceration, and a host of other intersecting circumstances that travel with people wherever they go. Moreover, gentrification—itself exacerbated by climate change[2]—and other factors drive people and families into and out of particular geographic areas at an increasing pace. Geographic definitions are important, but if they are the only measure, the result will be sacrificing real equity for administrative oversimplification. Maryland should instead follow the example of the federal Justice40 Initiative, which issued interim guidance to federal agencies last year indicating that agencies "should define community as "either a group of individuals living in geographic proximity to one another, *or* a geographically dispersed set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions" (emphasis added).[3]

It is also crucial that members of priority communities be involved in the creation and implementation of these definitions, and other aspects of the bill. Lawmakers should consider allowing compensation and enhanced stipends for members of the Commission on Environmental Justice and Sustainable Communities representing environmental justice communities. Moreover, the Commission should not merely *solicit* input from all segments of the population that will be impacted by the policies it develops; it should create and fund means for engaging in proactive, culturally competent outreach and engagement in partnership with local organizations, and for compensating community members for their time and expertise via surveys, meetings, or other avenues for input.

Workforce Development

GRID Mid-Atlantic applauds the bill's creation of a Maryland Climate Justice Corps Program. However, we are concerned with the six-month commitment target, which may limit participation from

[1] See https://gridalternatives.org/regions/midatlantic/solar-works-dc.
[2] See, e.g., https://www.nrdc.org/stories/what-climate-gentrification.
[3] Shalanda D. Young, Brenda Mallory, and Gina McCarthy, *Memorandum for the Heads Of Departments and Agencies re: Interim Implementation Guidance for the Justice40 Initiative* at 2 (July 20, 2021), available at https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf.

communities most underrepresented in relevant industries and which may also unnecessarily exclude shorter-term programs with a track record of success. For example, the job-training component of the well-established Solar Works DC Training Program serves several training cohorts per year including regular cohorts that participate in 12 weeks of training, and a summer youth program that follows a 6-week course.

GRID Mid-Atlantic is also concerned that participants in the Maryland Climate Justice Corps Program would be deemed "stipend volunteers" and could only "receive a stipend, as determined by the Trust, based on the needs of the stipend volunteer and the limits of budgetary appropriations." Many people, including young people, simply cannot take extended periods without family-sustaining wages and benefits. The Maryland Climate Justice Corps Program should not amount to just a local version of a "service trip" where young adults with means go to underserved areas as a matter of charity. Rather, it can and should play a meaningful role in expanding the benefits of the clean energy transition, including high quality careers, to members of all communities. To build a genuinely inclusive and just clean energy future, training stipends and other program components must be robust enough to attract and benefit participants from a wide range of backgrounds and circumstances.

Other Provisions

GRID Mid-Atlantic strongly supports other provisions in the bill, including but not limited to:

- the improved overall climate targets; the creation of Climate Catalytic Capital Fund targeting the implementation of energy and weatherization measures for low- to moderate-income households;
- the exemption from property tax for certain distributed solar systems including community solar serving low- and moderate-income customers;
- the requirements for solar-ready new buildings; and
- the development of plans for funding the retrofit of covered buildings to comply with building emissions standards, especially for affordable housing providers and low-income households.

The climate crisis is a multifaceted problem rooted in historical and ongoing injustices. Thus, it is not only appropriate but urgently necessary for Maryland to take a comprehensive and justice-oriented approach to addressing it.

* * *

GRID Mid-Atlantic is very pleased to see Maryland's leaders prioritizing climate ambition and equity. We thank you for your consideration of SB 528, the Climate Solutions Now Act of 2022, and we hope that you will advance it.

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SB 528_FAV_MML.pdf
Uploaded by: Angelica Bailey
Position: FAV

Maryland Municipal League

The Association of Maryland's Cities and Towns

TESTIMONY

February 15, 2022

Committee: Senate Education, Health, and Environmental Affairs

Bill: SB 528 – Climate Solutions Now Act of 2022

Position: Support

Reason for Position:

The Maryland Municipal League supports Senate Bill 583, which provides ambitious and necessary goals to reduce the State's greenhouse gas emissions.

Though this measure will likely increase local expenditures, many of the proposed goals are phased in which is both reasonable and necessary. Climate change is a very real threat and MML supports mitigating its negative impacts on residents' lives, as well as municipal budgets.

For this reason, the Maryland Municipal League supports SB 583 and respectfully requests a favorable committee report.

FOR MORE INFORMATION CONTACT:

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Angelica Bailey	Director, Government Relations
Bill Jorch	Director, Research & Policy Analysis
Justin Fiore	Manager, Government Relations

SB 528 Climate Solutions Now Act of 2022 FINAL.pdf
Uploaded by: deborah miller
Position: FAV

JCRC
JEWISH COMMUNITY RELATIONS COUNCIL

Government Relations • Israel Advocacy
Inter-Group Relations • Social Justice
Maryland • Virginia • Washington, DC • Since 1938

Testimony in SUPPORT of *Senate Bill 528 – Climate Solutions Now Act of 2022*
Education, Health, and Environmental Affairs Committee
February 15, 2022

The Jewish Community Relations Council of Greater Washington (JCRC) serves as the public affairs and community relations arm of the Jewish community. We represent over 100 Jewish organizations and synagogues throughout Maryland, Virginia, and the District of Columbia. The JCRC is strongly committed to cultivating a society based on freedom, justice, and pluralism. We work tirelessly throughout the entire Greater Washington area to advocate for our agencies that serve the most vulnerable residents, support our Jewish day schools and community centers, and to campaign for important policy interests on behalf of the entire Jewish community.

The JCRC has a long history of favoring policies which promote climate justice, protect the environment, and reverse climate change. Our agency is committed to addressing the detrimental effects of climate change, which is accelerating due to human behaviors, many of which are within our power to change. Senate Bill 528 – Climate Solutions Now Act of 2022 - requires the state to reduce statewide greenhouse gas emissions through the use of various measures, including the alteration of statewide greenhouse gas emissions goals, the establishment of a net-zero statewide greenhouse gas emissions goal, the development of certain energy efficiency and electrification requirements for certain buildings, and requiring electric companies to increase their annual incremental gross energy savings through certain programs and services.

SB 528 requires that by January 2030, at least 75 percent of the electricity supply procured for use in state facilities shall be derived from low-carbon renewable energy sources. While this stipulation is not inconsistent with our agency's environmental policy resolution, it might be more effective to require a percentage reduction in the current level of carbon emissions, however achieved. That is, carbon emissions can also be reduced through conservation and efficiency improvements. Additionally, given that the JCRC represents more than 50 houses of worship in the state, we would like to ask for clarification in SB 528 regarding the establishment of building emissions standards for state and non-state buildings and specifically about the definition of "commercial building." While we support SB 528, we also ask for the committee to consider our suggestions and clarify our questions.

SB528_Quaker Voice Maryland_fav.pdf
Uploaded by: Dona Sorce
Position: FAV

Quaker Voice of Maryland

February 14, 2022

Testimony in SUPPORT of SB528 – Climate Solutions Now Act of 2022

Dear Chairman Pinsky and Members of the Committee,

Quaker Voice of Maryland supports SB528, the Climate Solutions Now Act of 2022

Globally, we are at a juncture that will determine the course of our future forever. Climate change is here, and we are the last generation that will be able to change the course of the earth towards a livable future for all. We have the tools, resources and knowledge, and leadership to act right now.

Quaker Voice was formed by Quaker Meetings throughout Maryland to give Maryland Quakers a stronger voice in state-level issues that speak to our values. Our faith as Quakers is entwined with our commitment to stewardship of the Earth and care for our natural resources. We see how the misuse and destruction of these resources creates inequality, destroys community, affects health and well-being, leads to war and erodes our integrity. We are all responsible for the care of our planet Earth. We love this world as God's gift to us all. As citizens of the United States and Maryland, we understand that we represent the wealthiest of the world's population. As such, we acknowledge our obligation as well as the opportunity to reduce the rate of destructive climate changes and at the same time invest in clean energy production, healthier communities, green infrastructure, and transportation that is not reliant on carbon producing vehicles.

For many years scientists around the globe have been urging action on climate change with increasing alarm regarding the rate of change that is now at a crisis level. Here in Maryland, we have a lot at stake, with ever increasing incidences of destructive and life-threatening nuisance flooding, high heat days, and storm surges. We can no longer ignore the impact of air polluting emissions of carbon dioxide and methane on frontline communities in Maryland where residents and workers experience the highest rates of asthma and other respiratory illness in the State. Maryland State agencies have begun the work of establishing foundations from which we may respond to and mitigate the impact of this change. However, we must move towards a policy of healing and preventing further harm. We have an opportunity to act on the advice of scientists now while signaling to the nation that Maryland is ready to embrace the new green economy. There is no more time to delay on meaningful climate action.

We encourage a FAVORABLE report for this essential legislation.

Dona Sorce

Working Group Member, Quaker Voice of Maryland
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Boesch statement on Senate Bill 528 .pdf
Uploaded by: Donald Boesch
Position: FAV

Senate Bill 528 Climate Solutions Now Act of 2022

Senate Committee on Education, Health and Environmental Affairs, February 15, 2022

Testimony by Donald F. Boesch, Ph.D.

Chairman Pinsky and members of the Committee, I am Donald Boesch, now retired as Professor Emeritus from the University of Maryland Center for Environmental Science. I served as the Center's President from 1990 to 2017 and, as such, as a member of the Maryland Commission on Climate Change and chair of its Scientific and Technical Working Group. I am now speaking only for myself as a scientist with substantial experience in climate science assessments.

I will not describe the many severe impacts and risks of human-caused climate change because Maryland has already committed to limiting them through the enactment of Greenhouse Gas Emissions Reductions Acts of 2009 and 2016. I will try to briefly explain why science indicates that it has become more urgent that we aggressively reduce our emissions of carbon dioxide and other heat trapping gases. In addition to setting new commitment timeframes, Maryland must enable bolder mechanisms to reduce these emissions. In other words, we must act with urgency and agency—and SB 528 does that.

Scientist are by training and method cautious and conservative. In 2011, when I was a contributing author to the National Academy of Sciences report *America's Climate Choices*,[1] one of co-authors, a distinguished climate scientist, balked at describing the need to act as "urgent," so we substituted "pressing" instead. In 2019, I chaired another committee charged with crafting a position statement for the 60,000-member American Geophysical Union. By then we had no reservation entitling the statement: *Society Must Address the Growing Climate Crisis Now*.[2] Virtually no climate scientist would disagree that there is a truly urgent need to rapidly reduce our greenhouse gas emissions.

Why has there been this shift in this sense of urgency? It isn't so much that the world has warmed more than scientists thought. In fact, the global warming forecasts produced in the 1980s have turned out to be quite accurate, even those modeled by Exxon's scientists. Yes, some resulting changes have happened faster than expected, such as melting of glaciers, intense rainfall events, and wildfires. As you are aware, we are already experiencing both the incremental and devastating impacts of the climate changes caused by humans.

The main reason for the increased sense of urgency is that greenhouse gas emissions and concentrations have continued to grow. The carbon dioxide emitted remains in the atmosphere for 300 to 1,000 years and the methane, an even more potent greenhouse gas, remains for about a decade. We face a rapidly closing window in which we must eliminate emissions to avoid exceeding concentrations in the atmosphere that result in crossing dangerous thresholds of irreversible change.

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[1] https://www.nap.edu/catalog/12781/americas-climate-choices

[2] https://www.agu.org/Share-and-Advocate/Share/Policymakers/Position-Statements/Position_Climate

After the Paris Agreement, the Intergovernmental Panel on Climate Change, or IPCC, in 2018 determined that in order to limit warming to 1.5°C, as a global average, net CO_2 emissions must be reduced to zero by mid-century and emissions of other greenhouse gases, such as methane, must also to be substantially reduced. This conclusion was strengthened in the latest IPCC Assessment released in August, 2021. The emissions pathways capable of reaching net zero by 2050 require reductions of 50% by 2030. If this is not achieved the 1.5°C window is nearly shut. Keep in mind that these are global emissions, so that the high per-capita emissions from the United States, with its wealth and potential for innovation, must be more ambitious than this.

While the commitment made in 2009 for a 25% reduction in Maryland's emissions by 2020 and another commitment in 2016 for 40% by 2030 seemed bold at the time, they are now clearly deficient. Furthermore, unlike a number of other states, Maryland still lacks any legal commitment to greenhouse gas emissions reductions beyond 2030. Thus, the commitments for reductions in net greenhouse gas emissions included in SB 528 of 60% by 2030 and 100% by 2045 (from 2006 levels) are consistent with Maryland's place in the world, the Paris Agreement, IPCC scientific assessments, national targets set by President Biden, and commitments made by California, New York and other leading states.

In the present situation in which delaying action by just a year or two matters a lot, the *2030 Greenhouse Gas Reduction Action Plan* released in February 2021 by the Maryland Department of the Environment took too long to develop. It was more ambitious that the 2019 draft in estimating—using some questionable assumptions—that Maryland's emissions could be reduced by as much as 50% by 2030 as this figure from the Plan indicates (Figure 1). Still, the Plan does not lay out a pathway to achieve net-zero emissions by 2045—a goal that it commendably embraces. The actions proposed in the Plan would only achieve about a 70% net reduction by 2050. The red curve I have superimposed on the figure shows why a 60% reduction by 2030 is better aligned with the pathway to net zero by 2045.

In other words, while the MDE Plan accepts the urgent demand for emission reductions, it does not include the agency—the means or capacity—to match its ambition. Clearly, we need to act now in 2022 to provide that agency, including the necessary statutory authorities. We cannot afford to wait until 2030, take stock of the reductions that have been achieved, and then spend another couple of years considering how navigate an even steeper decline to net zero.

The MDE Plan also makes clear where we need to provide the agency needed to achieve these emission reductions. The second figure, showing the Plan's projections of emissions by sector, indicates that the anticipated reductions by 2030 will come from largely from electricity generation. By 2050 the largest emissions gaps remaining based on present policies and programs would be from the transportation (in dark green) and residential and commercial building (blue and gold) sectors.

Very appropriately then, the Climate Solutions Now Act of 2022, provides consequential and heretofore missing capacity to achieve significant reductions in the transportation and residential and commercial building sectors. It does this in numerous ways, including providing

for a Climate Catalytic Capital Fund, setting building electrification and emissions standards, and advancing mass transit and zero-emissions vehicles. I want to emphasize that virtually all of these actions were recommended in one form or another by the Maryland Climate Change Commission in its 2021 report. Furthermore, SB 528 also mandates an all-of-government approach in which all decisions made by Maryland state agencies are examined through the lens of limiting harmful climate change.

With all this in mind, I urge the General Assembly to pass the Climate Solutions Now Act of 2022 and Governor Hogan to sign it into law. We need both the urgency and the agency that it provides.

Dr. Donald F. Boesch
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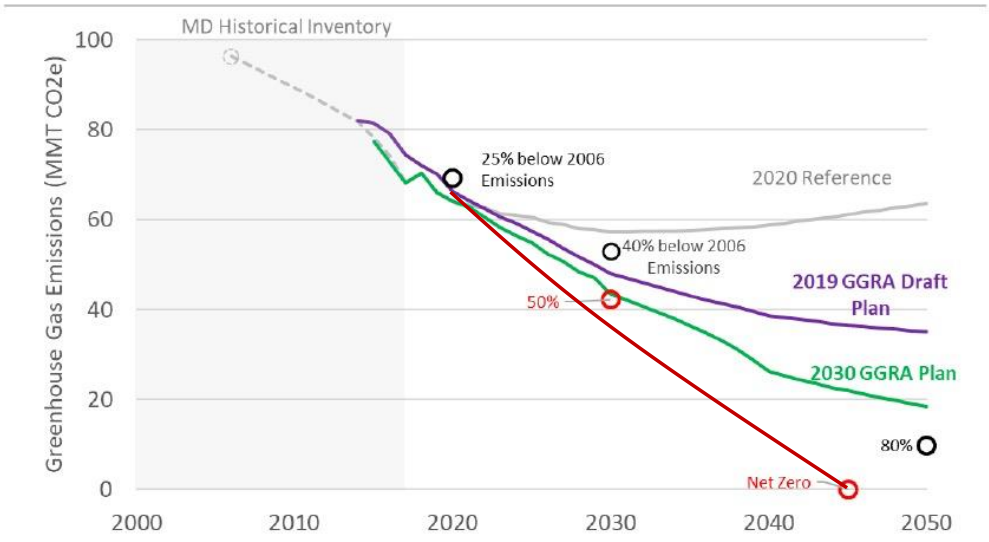

Figure 1. 2030 GGRA Plan emission reduction projections (Figure ES-4) with a red line superimposed to illustrate the necessary pathway to net-zero emissions in 2045, a target recommended by the Maryland Commission on Climate Change and accepted in the Plan.

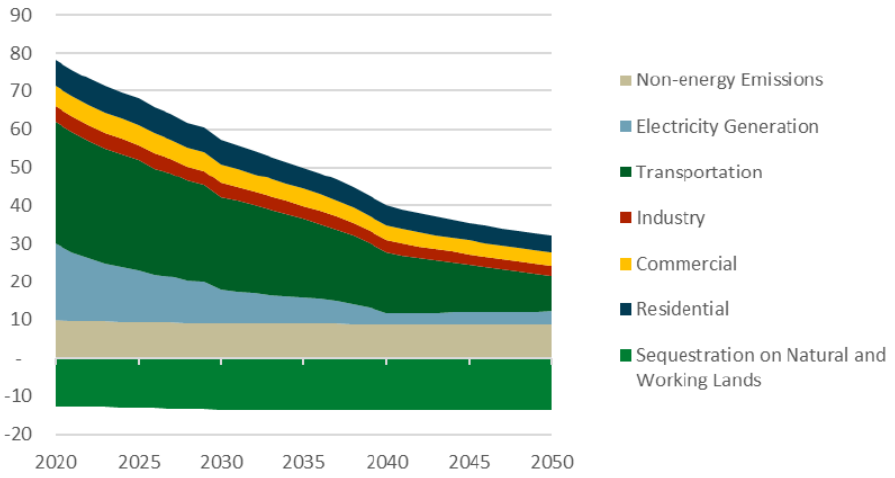

Figure 2. Maryland greenhouse gas emissions projections by sector under the 2030 GGRA Plan (Figure ES-5).

SB528Clean Air Task Force Schmidt-Perkins FAV.pdf
Uploaded by: Dru Schmidt-Perkins
Position: FAV

Clean Air Task Force
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February 15, 2022

SB 528 Climate Solutions Now Act of 2022

Position: Support

Clean Air Task Force (CATF) supports SB 528, which requires net-zero statewide greenhouse gas emissions by 2045.

California, Hawaii, Louisiana, Massachusetts, Michigan, Nevada, New York, Virginia, and Washington have all made legally binding net-zero or carbon neutrality targets for no later than mid-century. In addition, a diverse group of states across the United States (U.S.), representing 27% of U.S. electricity consumption, have adopted clean energy standards for the electric sector with commitments to be fully decarbonized by no later than mid-century. In 2021 alone, Illinois, North Carolina, and Oregon, representing 7% of U.S. electricity consumption, enacted clean energy legislation.

CATF notes that in implementing a net-zero target, most recent studies demonstrate that employing an "all-of-the-above" suite of clean energy technologies will likely be necessary to achieve deep decarbonization at least cost.[1]

Along with our support, we are providing some additional comments for your consideration.

- CATF recommends including a representative of the fossil fuel industry within the Just Transition Employment and Retraining Working Group who has been dislocated by the downsizing of the fossil fuel industries.
- Oregon adopted new landfill methane emissions regulations in 2021.[2] CATF recommends considering Oregon's new Landfill Methane Regulations as a basis for the minimum stringency of the SB 528 methane standard, instead of California's Landfill Methane Regulations, which were adopted in 2010.

The following comments are directed to the Maryland Department of the Environment (Department) during the development of it its proposed plan to reduce statewide greenhouse gas emissions, which will be submitted to the Governor and General Assembly on or before June 30, 2023. CATF is open and willing to provide further expertise to assist the Department with its planning.

- CATF recommends that the Department's plan propose reducing each separate greenhouse gas within its own reduction pathway (e.g., methane, CO_2, etc.).[3]
- In the case of methane reduction, CATF recommends a target of 60% by 2030.

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[1] https://www.vibrantcleanenergy.com/wp-content/uploads/2021/10/US-Econ-Decarb_CCSA.pdf See also: Net Zero America Project Report (https://netzeroamerica.princeton.edu/img/Princeton_NZA_Interim_Report_15_Dec_2020_FINAL.pdf) and Decarb America "Pathways to Net-Zero Emissions (https://decarbamerica.org/report/pathways-to-net-zero-emissions/)

[2] https://www.wastedive.com/news/oregon-landfill-methane-emissions-rule-strictest/608652/

[3] https://cdn.catf.us/wp-content/uploads/2020/09/21092651/AQCC-GWP-methane-June-16-2020-Final.pdf

- CATF recommends that the proposed reductions not permit that overcompliance for one requirement offset noncompliance with the other. This approach is based on the risk that using a higher global warming potential for methane, relative to other greenhouse gases, such as CO_2, can slow down mitigation of different greenhouse gases if multiple greenhouse gases are lumped together under a single policy.
- CATF recommends that the Department's plan improve upon prior regulations that control methane leakage. The reduction of methane leakage, and therefore overall methane emissions, will assist with the state's plan to reach net-zero statewide greenhouse gas emissions by 2045.

CATF also notes that the inclusion of other clean firm power generation sources, in addition to geothermal (e.g., advanced nuclear),[4, 5] in SB 528's allowable "low-carbon renewable energy source[s]" would incentivize the deployment of these zero-carbon resources within Maryland.

Finally, CATF notes and supports the inclusion of carbon capture and storage (CCS) technology as a greenhouse gas emission reduction measure within SB 528. The inclusion of CCS supports the ability to reduce greenhouse gas emissions from hard-to-abate industries (e.g., cement), the expansion of clean firm power for the maintenance of grid stability and is a key piece of a low-cost fully decarbonized electric system.

We urge the Committee to issue a favorable report on SB 528.

Please reach out to Angela Seligman (email: aseligman@catf.us, cell: 314.922.5293) with any questions.

CATF is a global nonprofit organization working to safeguard against the worst impacts of climate change by catalyzing the rapid development and deployment of low-carbon energy and other climate-protecting technologies. With 25 years of internationally recognized expertise on climate policy and a fierce commitment to exploring all potential solutions, CATF is a pragmatic, non-ideological advocacy group with the bold ideas needed to address climate change. CATF has offices in Boston, Washington D.C., and Brussels, with staff working virtually around the world.

[4] https://www.vibrantcleanenergy.com/wp-content/uploads/2021/10/US-Econ-Decarb_CCSA.pdf

[5] https://www.catf.us/wp-content/uploads/2021/06/NorthBridge_Deep_Decarbonization_Literature_Review.pdf

SB528 Testimony_FAV_Preservation Maryland.pdf
Uploaded by: Eleanor Cowan
Position: FAV

Testimony of Elly Cowan

Director of Government Relations, Preservation Maryland

Before the
Senate Education, Health, and Environmental Affairs Committee
February 15, 2022

Pertaining To: SB528, Climate Solutions Now Act of 2022
Support

On behalf of the staff and Board of Directors of Preservation Maryland, I thank you for the opportunity to provide testimony on the value of smart growth and preservation in Maryland. Through our Smart Growth Maryland program, Preservation Maryland advocates for a more environmentally and economically sustainable future that creates opportunities for all Marylanders through better development patterns.

SUPPORT FOR SENATE BILL 528

Preservation Maryland supports SB528, Climate Solutions Now Act of 2022. This omnibus bill seeks to address the climate change crisis and environmental justice issues that face our state. The legislation will increase Maryland's greenhouse gas reduction requirements to 60% below 2006 levels by 2030 and net zero by 2045. The bill would also address environmental justice by establishing the Climate Catalytic Capital Fund to support emissions reducing projects in overburdened communities, directing MDE, in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities, to research and gather data on cumulative impacts and overburdened communities, and establishes a Climate Justice Corps. The bill creates a work group comprised of labor leaders, legislators, the Secretary of Labor's office, climate groups, and renewable energy companies to make recommendations on how best to serve fossil fuel workers in Maryland. It also works to remove emissions from buildings, which are one of the largest emitters of greenhouse gasses.

We are in the midst of a climate change emergency, with the urgency of the crisis growing every year. The opportunity to take the necessary aggressive actions to effectively mitigate the worst effects is dwindling. Maryland's more than 3,000 miles of shoreline and more than 265,000 acres of low-lying land make our state one of the most vulnerable to sea level rise and the effects of increasingly violent weather events, and we are already seeing the devastating effects all across our state. Additionally, this legislation is grounded in the understanding that climate justice is environmental justice, with climate change disproportionately impacting the health, environment, and income of many low-wealth communities and communities of color.

Maryland has an opportunity to demonstrate real leadership in climate policy and show the rest of the country what is possible. The Climate Solutions Now Act puts us on this path. Therefore, I respectfully urge a favorable report of SB528.

Contact: Elly Cowan, Preservation Maryland 443-386-4609

climate solutions now final pdf (2).pdf
Uploaded by: Elise Riley
Position: FAV

Committee: Education, Health and Environmental affairs
Testimony in SUPPORT of SB 528 – *Climate Solutions Now Act 2022*
Position: Favorable
Hearing Date: February 15, 2022

Dear Chairman Pinsky and members of the committee,

Chesapeake Physicians for Social Responsibility is a statewide organization of over 940 physicians and other health professionals and supporters that addresses the existential public health threats to life on this planet: the climate crisis, nuclear weapons and the issues of pollution and toxic effects on health. We advocate for public policy that addresses these threats based on evidence and through the lens of racial justice and equity.

Today we face the multigenerational threat of climate change. We are at a critical decision point that will determine the course of our future forever. Climate change is already here, and we are the last generation that will be able to course correct towards a livable future for all. This requires urgent action from many sectors. The Climate Solutions Now Bill 2022 is a major step in addressing this urgent issue. .

This bill ensures Maryland will be part of the new green future by addressing multiple issues including:

- Ensuring Maryland is in line with the current climate science by requiring a 60% reduction in greenhouse gases by 2030 (based on 2006 levels) and to reaching net neutrality by 2045
- Investing resources in overburdened communities
- Updating our methane accounting practices
- Taking a number of steps to reduce emissions, such as electrifying state vehicles, and school buses, measures improve energy efficiency in schools and new buildings

Climate change is on our doorstep. Rising seas caused by Climate Change result in frequent flooding in Annapolis and all along Maryland's extensive coastline. NOAA notes that the Chesapeake Bay is the 3rd most vulnerable area of the United States to sea level rise. Dorchester
County is presently the 4th largest county and it is expected to be the 14th largest by the year 2100 as ½ of the county becomes open water. Ellicott City had 2 episodes of "once in a 1000 year rains" in 2 years. Sirens now warn residents after heavy rains .Statistics confirm what Marylanders already know our summers are heating up and lasting longer. Extreme heat events have increased by more than 100% between the 1980's and the 2000's when compared to the 1960s-1970s, a rapid rise that is unprecedented. In addition to all the problems that occur because of this there are specific effects on the health of our citizens particularly our most vulnerable populations.

Patients now suffer more seasonal allergies from plants such as ragweed whose pollen seasons have lengthened with rising temperatures. Levels of pollutant are higher and put air quality in the unhealthy zone more often with heat. People with chronic lung conditions have more serious challenges on Code Red bad air days. In April 2016 the “Maryland Climate and Health Profile Report” from the Maryland Department of Health and Mental Health Hygiene and University of Maryland School of Public Health noted that extreme heat was associated with more heat related hospitalizations especially in Baltimore, There were increased hospitalizations for Asthma overall but especially for non-Hispanic whites and children age 5-17. It is not just our breathing that is affected by heat and pollution but also heat exacerbates the effects of cardiovascular disease Extreme heat events increased the risk of heart attacks in those over the age of 65.The increase risk for heart attacks due to heat events was a 27% increase for non- Hispanic blacks and 9% for non-Hispanic whites

Severe heat also results in more food and waterborne infections such as Salmonella and Campylobacter which can cause food poisoning and lead to serious illness. Coastal communities in particular suffer higher incidences of Salmonella related outbreaks as a result of these extreme weather events. Public Health Research has demonstrated that small temperature changes can lead to the emergence of serious insect borne diseases not previously seen in Maryland as well as an increase incidence of known vector borne diseases, notably Lyme Disease.

The 4th National Climate Assessment from 2018 noted that “the health and wellbeing of Americans is already affected by climate change, with adverse health consequences projected to worsen with additional climate change .Climate change affects human health by altering exposures to heat waves, floods, droughts, and other extreme events: vector-, food-, and waterborne infectious diseases, changes in the quality and safety of air, food and water and stresses to mental health and wellbeing”

The 2019 US call to Action on Climate Health and Equity a Policy Action Agenda. Noted Climate change is a Health Care **Emergency**. This call to Action was signed onto by more than 70 major medical groups. Including the AMA , ACP, AAFP and the AAP.

Our own Maryland Commission on Climate Change, which is an intergovernmental panel on Climate Change and the International Panel on Climate Change both, noted that developed nations need to reduce emissions to net zero by 2045. This bill is a major step towards achieving that goal. We have an opportunity to listen to scientists now while signaling to the nation that Maryland is a leader in addressing climate issues. There is no more time to delay on meaningful climate action. Chesapeake Physicians for Social Responsibility urges support for SB528 Climate Solutions Now Act 2022. The public health costs of inaction are too great.

Elise Riley MD FACP
Steering Committee
Chesapeake Physicians for Social Responsibility

Resources:

1. NOAA National Centers for environmental Information/ State Climate summaries, www.NCEI.NOAA.gov

2. Documentary Film “High Tide in Dorchester” https://www.mpt.org/stationrelations/high-tide-in-dorchester

3. Maryland Climate and Health Profile Report 2016 through mde.maryland.gov

4. 4th National Climate Assessment, Climate Impacts in the United States, https://nca2018.globalchange.gov

5. 2019 US Call to Action on Climate Health and Equity, signed onto to by more than 70 health care organizations, climatehealthaction.org

6. Maryland Commission on Climate Change, through mde.maryland.gov

SB528_bsinger_fav.pdf
Uploaded by: Elizabeth Singer
Position: FAV

JEWISH FEDERATION OF HOWARD COUNTY
JCRC
JEWISH COMMUNITY RELATIONS COUNCIL

TESTIMONY TO THE SENATE EDUCATION, HEALTH, AND ENVIRONMENTAL AFFAIRS COMMITTEE
SB 528 – Climate Solutions Now Act of 2022
POSITION: FAVORABLE

By: Betsy Singer and Laura Salganik, Co-Chairs
Date: February 15, 2022

The Jewish Community Relations Council of the Jewish Federation of Howard County believes that climate change is a human-induced, international security threat and one of the greatest moral issues of our time. The JCRC endorses and supports continued advocacy for legislation in Howard County and at the state level to require clean, renewable energy and discourage continued dependence on fossil fuels that emit carbon dioxide and warm the Earth's atmosphere.

The issue of justice must be central to the actions we take in moving away from fossil fuels toward clean energy sources such as wind and solar. Following a proposed national standard, all efforts in Maryland to reduce harmful emissions must guarantee that at least 40% of climate investments and benefits accrue to disadvantaged communities. Communities of color in our state have historically suffered disproportionately from dirty energy and climate impacts. Our climate solutions must reach these communities first.

The Climate Solutions Now Act, if passed without weakening amendments, will begin reversing negative trends while taking concrete steps toward a carbon-free Maryland for all and achieving climate, equity, and clean energy goals.

Those goals must include:

1) A mandate to cut greenhouse gas emissions 60% by 2030 (below 2006 levels).
2) A requirement that all newly constructed buildings in Maryland have electric-only energy systems exempting only kitchen appliances.
3) Serious efforts to begin electrifying our transportation system starting with school buses and state-owned vehicles.
4) Robust climate investments in overburdened and low- and moderate-income communities, including a Climate Justice Corps that will support clean energy projects and create jobs for young adults.
5) A Net Zero School Fund to assist local school systems in building net-zero schools.

We urge you to immediately pass SB 528, the Climate Solutions Now Act of 2022.

10630 Little Patuxent Parkway, Suite 400
Columbia, MD 21044

SB528_EnvMD_FAV_CSNA.pdf
Uploaded by: Emily Scarr
Position: FAV

SB528 - Climate Solutions Now Act of 2022
Education, Health and Environmental Affairs
February 15, 2022
Position: Favorable
From: Emily Scarr, Maryland PIRG Director emily@marylandpirg.org

Maryland's reliance on polluting fuels puts our health and safety at risk. Our state energy policy must conserve more energy, use the energy we have wisely and efficiently, and rely only on sources of energy that are clean, renewable and tread lightly on our planet. We support SB528, the Climate Solutions Now Act, because it improves upon our state's current plan and puts us on a better path to reach these goals.

We have to stop burning fossil fuels to power our homes, buildings, and transportation.

Burning fossil fuels within our homes creates indoor and outdoor air pollution, which contributes to the development of respiratory diseases, heart disease and cancer. In its annual report, the Maryland Commission on Climate Change recommended that 50 percent of space heating equipment sales be electric heat pumps by 2025. The commission also recommended that the Maryland Building Codes Administration require new construction to be all-electric for single-family homes by 2025, commercial buildings by 2026, and public buildings as soon as possible.

Last year, Maryland PIRG Foundation and Environment Maryland Research and Policy Center released Electric Buildings 2021: Repowering Homes and Businesses for Our Health and Environment, a report that delves into the latest advances in efficient electric technologies, which make going all-electric in buildings a win-win for consumers and the environment.

Getting on the right track
Our state's current reduction framework does not come close to accomplishing the recommended cuts in emissions that we need in order to mitigate the worst impacts of climate change.

This legislation puts us on the right track to achieve our climate goals by updating Maryland's greenhouse gas reduction mandate to 60% by 2030 and net zero by 2045. Anything less ambitious than that simply will not be enough to combat climate change and protect Marylanders' health and safety.

You have the opportunity this session to put us on a path to a future with clean air and a livable climate. A future with efficient transportation and buildings, powered by clean, renewable energy.

We thank you for your leadership and urge you to vote favorably on SB528.

Maryland PIRG is a state based, small donor funded public interest advocacy organization with grassroots members across the state. For fifty years we've stood up to powerful interests whenever they threaten our health and safety, our financial security, or our right to fully participate in our democratic society.

Environment Maryland is a citizen-based environmental advocacy organization. We work to protect clean air, clean water, and open space.

SB528_Favorable_MdPHA.docx.pdf
Uploaded by: Erica Weiss
Position: FAV

MdPHA
Maryland Public Health Association

Mission: *To improve public health in Maryland through education and advocacy* ***Vision:*** *Healthy Marylanders living in Healthy Communities*

SB0528 Climate Solutions Now Act of 2022
Hearing Date: January 15, 2022
Committee: Education, Health, and Environmental Affairs
Position: SUPPORT

Thank you, Chair Pinsky, Vice-Chair Kagan, committee members and fellow bill sponsors, Senators Ferguson, Kelley, Guzzone, Smith, Kagan, Waldstreicher, Lam, Washington, Patterson, Hester, Ellis, Zucker, Kramer, Hettleman, Young, Sydnor, Hayes, Watson, Beidle, Carter, Augustine, Elfreth, Feldman, Jackson, King, and Lee.

We submit this testimony on behalf of the Maryland Public Health Association (MdPHA) to express our SUPPORT for SB0528 – Climate Solutions Now Act of 2022. We appreciate this bill's purpose to save lives with smart strategies to achieve net-zero emissions by 2045, reduce environmental injustice, reduce emissions from buildings, and create a workgroup to protect workers'jobs. We view this bill as an important step to improve the lives of all Marylanders.

As you know, climate change is an urgent public health threat. From extreme heat, flooding, air pollution, to the easier spread of disease and more, climate change is impacting health across the state. Exposure to elevated levels of air pollution from greenhouse gasses and related increases in ozone and particulate pollution, contributes to asthma attacks, cardiovascular disease and premature death. Exposure to higher and more lingering heat (especially for outdoor workers), significantly increases the risk of costly heat-related illness, and hospitalization for asthma and heart attacks.[1]

Over the past year we have seen how interconnected the COVID-19 pandemic, climate change, air pollution, and inequity are. A robust study by Harvard found that even a small increase in long-term particulate (PM2.5) exposure led to an 11% increase in the COVID-19 death rate.[2] The burning of fossil fuels is one of the biggest contributors to deadly air pollution, such as particle pollution.

Communities of color and low-income communities bear a disproportionate burden from the pollution caused by vehicle exhausts, inefficient landfills and incineration emissions, and out-of-date building construction. The environmental justice and health equity components of this bill are critical to ensuring that Marylanders benefit from a transition to a clean energy future and "green-collar" jobs, especially for residents overburdened by fossil fuel pollution.

What the pandemic has shown us is that we must treat COVID-19, climate change, and health inequities in tandem. The Climate Solutions Now Act is a step in the right direction. It will save lives and improve

[1]https://mde.maryland.gov/programs/Marylander/Documents/MCCC/Publications/Reports/MarylandClimateandHealthProfileReport.pdf
[2]Wu X, Nethery RC, Sabath MB, Braun D, Dominici F. Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. Science Advances. 2020;6(45).

Maryland Public Health Association (MdPHA)
PO Box 7045 · 6801 Oak Hall Ln · Columbia, MD 21045-9998
GetInfo@MdPHA.org www.mdpha.org 443.475.0242

health by reducing air pollution from fossil fuels and by reducing greenhouse gas emissions that worsen climate change. Please support this bill.

The Maryland Public Health Association (MdPHA) is a nonprofit, statewide organization of public health professionals dedicated to improving the lives of all Marylanders through education and advocacy in support of healthy Marylanders living in healthy communities. MdPHA is the state affiliate of the American Public Health Association, a nearly 145-year-old professional organization dedicated to improving population health and reducing the health disparities that plague our state and our nation.

Maryland Public Health Association (MdPHA)
PO Box 7045 · 6801 Oak Hall Ln · Columbia, MD 21045-9998
GetInfo@MdPHA.org www.mdpha.org 443.475.0242

SB 528 to EHEA support - Clinmate Solutions Now.pd
Uploaded by: Henry Bogdan
Position: FAV

MARYLAND NONPROFITS
marylandnonprofits.org

1500 Union Avenue | Suite 2500 | Baltimore, MD 21211
410.727.6367 | 800.273.6367 | Fax 410.235.2190

February 15, 2022

Testimony on Senate Bill 528
Climate Solutions Now Act of 2022
Senate Education, Health, and Environmental Affairs Committee

Position: Favorable

Maryland Nonprofits is a statewide association of more than 1300 nonprofit organizations and institutions. We urge you to support Senate Bill 528, the Climate Solutions Now Act of 2022, to achieve critical climate, equity and clean energy goals.

Those goals must include, without weakening:
1) A mandate to cut greenhouse gas emissions 60% by 2030 (below 2006 levels).
2) A requirement that all newly constructed buildings in Maryland have electric-only energy systems exempting only kitchen appliances.
3) Serious efforts to begin electrifying our transportation system starting with school buses and state-owned vehicles.
4) Robust climate investments in overburdened and low- and moderate- income communities, including a Climate Justice Corps that will support clean energy projects and create jobs for young adults.
5) A Net Zero School Fund to assist local school systems in building net-zero schools.

The issue of justice, again, must be central. Following a proposed national standard, all efforts in Maryland to reduce harmful emissions must guarantee that at least 40% of climate investments and benefits accrue to disadvantaged communities.

Communities of color in our state have historically suffered disproportionately from dirty energy and climate impacts. Our climate solutions must reach these communities first.

The Climate Solutions Now Act, if passed without weakening amendments, will begin reversing these trends while taking concrete steps toward a carbon-free Maryland for all. Please pass it immediately.

We urge you to give Senate Bill 528 a favorable report.

Mayor Day SB 528 FAV Testimony.pdf
Uploaded by: Jacob Day
Position: FAV

City of Salisbury
Jacob R. Day, Mayor

15 February 2022

Committees: Education, Health, and Environmental Affairs & Budget and Taxation
Testimony on: SB 528 – Climate Solutions Now Act of 2022
Position: Favorable

RE: Support For SB 528 – *Climate Solutions Now Act of 2022*

Dear Members of the Education, Health, and Environmental Affairs and Budget and Taxation Committees,

As you consider the merits of **SB 528**, I ask that you **support** this vital legislation and vote to give **SB 528** a **Favorable** Committee report.

The City of Salisbury supports SB 528, which will prioritize statewide climate action. This bill is essential as it protects our environment by reducing greenhouse emissions, establishing a requirement for zero-emission state vehicle fleets, and creating a Maryland Climate Justice Corps Program.

More specifically, SB 528 will:

- Help Maryland to achieve net-zero statewide greenhouse gas emissions by 2045
- Create a Climate Catalytic Fund to promote environmental justice and leverage investment in technology development and deployment
- Develop strategies to foster climate equity and resilience within disproportionately affected communities

As the Capital of the Eastern Shore, residents of our city have first-hand experience in contending with the effects of climate change. Whether faced with soil erosion in our tidal areas or the heavy flooding that has become synonymous with major storms, although we remain versatile, we must take meaningful action as we respond to environmental hazards that threaten the health of our Eastern Shore. Here in Salisbury, we continue to promote environmental stewardship and sustainable practices through the transformative work of our Green Team, whose members work to develop projects and policies that foster an atmosphere of social and environmental responsibility across Salisbury and the Lower Eastern Shore.

This legislation, if enacted, would effectuate much-needed climate action that will benefit all Marylanders, positively impacting a variety of areas ranging from the environment to economic development. SB 528 will help us to take meaningful action as we seek to turn the tides of climate change while also pursuing climate equity.

I ask for your **support** of this critical climate action legislation.

Respectfully,

Jacob R. Day
Mayor

Office of the Mayor
125 N. Division St., #304 Salisbury, MD 21801
410-548-3100 (fax) 410-548-3102
www.salisbury.md

Takoma Park 2022 - SB 528 FAV - Climate Solutions

Uploaded by: Jamal Fox

Position: FAV

CITY OF TAKOMA PARK, MARYLAND

SB 528
Support

Senate Education, Health & Environmental Affairs Committee
February 15, 2022
SB 528 Climate Solutions Now Act of 2022
City Contact: Cindy Dyballa, City Council Member
CindyD@takomaparkmd.gov

The City of Takoma Park supports the goals and intent of Senate Bill 528, and urges favorable consideration.

This bill would accelerate the state's overall greenhouse gas (GHG) emissions reduction goal from 40% to 60% by 2030, with a goal of net zero GHG emissions by 2045. Provisions address a wide range of state policies and actions to meet these goals: establish statewide building performance standards, electrify the state vehicle fleet, invest in climate pollution reduction in environmental justice communities, and address job impacts, among other provisions. These efforts, and more, are urgently needed statewide.

Throughout Maryland, we have seen that our climate statewide is dramatically and rapidly changing with devastating local consequences, and that we must dramatically reduce greenhouse gas emissions in the short term to address this. We must accelerate and expand efforts on the part of all levels of government, and the state of Maryland must take an aggressive leadership role and lead by example. Impacts statewide include more severe and frequent storms, greater rainfall, increased flooding, more frequent and extreme heat waves, sea level rise along our extensive coasts, and more. These impacts have significant economic consequences for us all. One major impact in Takoma Park is more stormwater runoff more often, challenging the capacity of our older infrastructure. There's no time to waste.

Takoma Park has been a leader among Maryland communities in responding to the challenges of climate change and in reducing greenhouse gas emissions through our many local policies and actions. But to truly fulfill our City's commitments, and dramatically reduce our GHG emissions, we need strong state leadership and action to support us.

In 2019 the City declared a climate emergency and set a goal of net zero GHG emissions by 2035. In 2020 the City adopted a Climate Emergency Response Framework to move aggressively to implement that goal. It focuses on buildings and transportation, the two areas of greatest GHG emissions in our community, and two major focus areas of this bill. Our City is publicly committed to action on climate change through the Global Covenant of Mayors for Climate and Energy, the Paris Climate Agreement and the Sierra Club 100% renewable energy pledge. Our City cannot reduce GHG emissions alone. Strong statewide programs and funding for climate solutions now is critical.

In sum, the City of Takoma Park supports the goals and intent of this bill, and encourages a favorable vote.

IPL Testimony on SB 528 - Climate Solutions Now Ac

Uploaded by: Jonathan Lacock-Nisly

Position: FAV

Interfaith Power & Light (DC.MD.NoVA)
900 Massachusetts Ave NW
Washington, DC 20001
202-525-9397 • jonathan@ipldmv.org

Jonathan Lacock-Nisly, Director of Faithful Advocacy
February 15, 2022

Testimony on SB 528 –
SB 528: Climate Solutions Now Act
Education, Health, and Environment Affairs Committee

Position: Favorable

Interfaith Power & Light (DC.MD.NoVA) supports SB 528.

Congregations of many faith traditions all across Maryland are taking action on the climate crisis because we are heartsick knowing that our climate pollution is hurting our neighbors, here and throughout the world.

It is simply not just that all of us, and especially communities of color, our elderly, and our young people, have paid the price for that pollution. Marylanders have paid for dirty energy with our health. We've paid when a disrupted climate exacerbates storms and brings flooding, like the *two* "thousand-year" floods that hit Ellicott City in 22 months.

That's why people of faith are taking action—choosing electric appliances that don't use harmful methane gas, installing solar panels on houses of worship and buying clean energy for our sacred spaces, and changing our transportation habits by riding public transit and buying electric vehicles.

In houses of worship across the state, clergy and lay leaders are sharing the message that another world is possible. The Climate Solutions Now Act is a way, here in Maryland, to take a meaningful step towards making that vision more real.

We can set a timeline for getting Maryland to net-zero climate pollution. We can electrify our buildings and turn away from burning fossil fuels. We can electrify our state vehicles, cleaning our air and reducing the number of childhood asthma attacks. And we can ensure that all of our communities benefit from and have a say in this process.

Maryland's faith communities are acting for our common home, for our neighbors, and for a clean energy economy. We call on our legislators to do the same.

We urge the committee to give SB 528 a favorable report, and we support the amendments submitted by both the CCAN Action Fund and the National Housing Trust.

People of faith from all across Maryland gathered on zoom in January of this year to learn about and show support for the Climate Solutions Now Act.

The Episcopal Diocese of Maryland, led by the Rt Rev. Eugene Taylor Sutton, gathered in Annapolis to advocate for a previous version of the Climate Solutions Now Act in early 2020.

People of faith gathered in Howard County in early 2020 to learn about the previous version of the Climate Solutions Now Act, and share how their faith has influenced their own climate action.

Marylanders gathered at Asbury United Methodist Church in Annapolis to advocate for the Climate Solutions Now Act's previous iteration in early 2020.

Hundreds of Marylanders, including faith communities, gathered in College Park in support of the Climate Solutions Now Act's previous iteration in December 2019. IPL-DMV's Director Joelle Novey called all those present to turn to a neighbor and share "Why does climate change matter to you?"

Testimony in SUPPORT of SB0528.pdf
Uploaded by: Joseph Jankowski
Position: FAV

Testimony in SUPPORT of SB0528 – Climate Solutions Now Act of 2022

Dear Chairman Pinsky and members of the Education, Health and Environmental Affairs Committee,

The Protectors of the St Martin River supports the Climate Solutions Now Act of 2022 SB0528.

The Eastern Shore of Maryland is extremely susceptible to sea level rise caused by climate change and action is required now to limit human action impact on climate change. This bill proposes solutions which Maryland can now take to address climate change.

Our organization has undertaken numerous efforts to restore healthy waterways in the coastal bays of Maryland, through education of residents in critical areas as to environmentally sensitive land management and through an oyster gardening program to reduce excess nutrients in the coastal bays. The Climate Solutions Now Act of 2022 through the reduction of greenhouse gas emissions will provide a significant contribution to the health and well-being of the coastal bays of Maryland.

Respectfully,

Joseph Jankowski, Director
Protectors of the St Martin River

SB 528 - Climate Solutions Now Act- SupportMW.pdf
Uploaded by: Justin Hayes
Position: FAV

COMPTROLLER of MARYLAND
Serving the People

Peter Franchot
Comptroller

TESTIMONY OF COMPTROLLER PETER FRANCHOT

Support – Senate Bill 528 - Climate Solutions Now Act of 2022
Education, Health, and Environmental Affairs Committee
February 15, 2022

Chair Pinsky, Vice Chair Kagan and members of the Committee, it is my pleasure to provide testimony in **support** of **Senate Bill 528 – Climate Solutions Now Act of 2022.** I would like to thank Senator Pinsky for sponsoring this important legislation, and the Committee for providing the opportunity for my testimony to be heard.

Climate change is one of the most pressing issues facing the world today, and our communities stand to bear the brunt from its devastating effects given our state's miles of shorelines, low-lying areas, and treasured natural resources all vulnerable to sea level rise and intense weather patterns.

Combatting climate change should be a top priority in Maryland, and Senate Bill 528 is a step in the right direction by introducing bold changes to the State's current approach. The bill requires the State to develop plans for a further 20 percent reduction in greenhouse gas emissions from 2006 levels by 2030 and achieve net-zero by 2045. I believe Maryland should become a regional leader by investing in renewable energy to become a net exporter of energy to the interstate grid, and Senate Bill 528 will ensure meaningful progress.

The bill also includes several provisions designed to ensure State government leads through example by mandating certain building performance standards, low-carbon energy procurement, and a state fleet transition to electric vehicles.

For the reasons stated above, and on behalf of the generations that will follow us who will inherit the Earth we leave behind, I respectfully request a **favorable report** for Senate Bill 528. Thank you for your time and consideration.

###

MCEC T2022 SB 528.pdf
Uploaded by: Katherine Magruder
Position: FAV

I. Katherine Magruder
Executive Director
ikm@mdcleanenergy.org
301-314-6061

Maryland Clean Energy Center (MCEC) was created as a not-for –profit corporate instrumentality of state in 2008 through an act of the Maryland General Assembly.

MCEC focuses on an economic development mission to advance the adoption of clean energy and energy efficiency products, services and technologies along with the associated jobs and wages for Maryland. MCEC leverages private capital and private sector capabilities; facilitates the commercialization of innovative advanced energy technologies; strives to reduce energy costs for consumers, and drive reductions in greenhouse gas emissions associated with the use of fossil fuels.

SB 528 – Climate Solutions Act of 2022

Hearing Dates: February 15, 2022
Senate Education, Health, Environmental Affairs Committee

FAVORABLE SUPPORT REQUESTED

MCEC appreciates the comprehensive nature of this proposed legislation, with the understanding that addressing the potential impacts of climate change while ensuring environmental justice requires a broad scope of measures and investments. The Economic Development Article within SB 528 calls for the creation and implementation of a Climate Catalytic Capital Fund (C3F) to be managed by the Maryland Clean Energy Center (MCEC). My testimony is offered with primary focus on this piece of the bill.

The purpose of the C3 Fund is to "promote environmental justice and to leverage increased private capital investment in technology development and deployment". As proposed, this fund would be capitalized in the amount of $5M per year over 3 years with funds deployed for specific purposes. The Fund is intended to act as leveraging capital to attract greater amounts of private investment to achieve certain desirable outcomes helping address climate change and environmental justice for Maryland. The bill specifies the types of investments that can be facilitated with the fund, and directs MCEC to administer the fund.

Key Messages I would like to leave with the committee in testimony are:

- There will always be more need for investment to commercialize and implement advanced clean energy infrastructure and climate mitigation measures than public funds alone can address.
- The proposed Climate Catalytic Capital Fund seeks to use a smaller investment of public funds to "crowd in" greater amounts of private capital for projects to address related challenges.
- Operating as a statewide green bank, MCEC is statutorily enabled to implement the directive in SB 528 related to the C3F. MCEC can effectively deploy these targeted resources to increase the overall amount of funds invested by public and private sources and achieve the intent of SB 528.

- Based on its demonstrated track record, MCEC anticipates leveraging $10 for every $1 invested by the State.

MCEC provides the link below for access to a report, directed by statue in SB 313 passed in 2017. Among the recommendations in this report, one calls for the State to "Create a Maryland Green Infrastructure Fund, supported by $55M in funding over five years to crowd in private capital, facilitate leveraging and generate fee income for MCEC". The proposed C3F could certainly be considered an appropriate response to that recommendation. https://www.mdcleanenergy.org/wp-content/uploads/2019/12/MCEC-Impact-and-Sustainability-Strategy-Report-12.2019.pdf

The MCEC Board of Directors has adopted the creation of a Climate Catalytic Capital Fund in the MCEC FY22 Strategic plan. As a quasi-governmental entity, MCEC is well positioned to enter into P3 structured transactions, which would not be duplicative of current grant and incentive programs offered by the Maryland Energy Administration. As a green bank, MCEC is able to utilize financing incentives to attract private capital in the form of loss reserves, rate buy-downs, gap financing and direct investment of lower cost capital as examples.

With the resources made available from the C3 Fund and using its bonding authority, MCEC can create a Maryland Green Bond program modelled after the successful version implemented by the Connecticut Green Bank, which has generated over $16M in private capital investment since its inception in 2021. https://www.ctgreenbank.com/2021-green-liberty-bond- the issuance-announced/

In regard to other directives proposed in SB528, which might impact MCEC, I wish to state for the record that the Center can make current personnel resources available to work in consultation with the proposed Maryland Climate Justice Corps.

MCEC participation in the proposed Building Implementation Energy Task Force, as proposed in SB528 may require MCEC to identify additional staff or consultant resources to contribute to the work of the group most effectively, and utilize available fiscal resources to address this directive.

MCEC urges this committee to give a FAVORABLE REPORT to SB 528.

SB528-AdvocatesForHerringBay-FAV-Feb-2022.pdf
Uploaded by: Kathleen Gramp
Position: FAV

Testimony of the Advocates for Herring Bay (AHB)[1]
Regarding SB 528: Climate Solutions Now Act
Submitted by Stephen Marley, February 14, 2022

Favorable, with comments and recommendations on a provision regarding financial incentives for community solar projects built on rooftops and other alternative surfaces

The Advocates for Herring Bay (AHB) commend the sponsors of SB 528 for crafting a holistic approach for reducing Maryland's emissions of carbon dioxide and other greenhouse gases. The bill tackles challenges across all sectors of Maryland's economy, and encourages the public and private sector to use energy and natural resources more efficiently and effectively.

AHB would like to express our support for and offer recommendations on a provision that would amend Article-Tax-Property 7-237 (C) to exempt community solar projects from local personal property taxes if they are built on rooftops, parking lots, roadways, or brownfield sites, and sell more than 51 percent their electricity to low- and moderate-income subscribers at a specified discount. In our view, two key benefits of that tax exemption are that it would:

- **Provide incentives for using previously developed surfaces in urban and suburban areas.** Every acre of impaired surface re-used for solar generation reduces the risk of losing forests or other ecologically valuable assets as Maryland decarbonizes its electricity grid. Given their small size, community solar projects are ideally suited to the large rooftops being added across the state to meet the surging demand for warehouses and other industrial spaces.[2] Maximizing the use of previously developed surfaces is especially important for the community solar program, which is concentrated in the Baltimore-Washington region, where the demand for both electricity and land are high.

- **Help level the financial playing field for ecologically beneficial community solar projects.** Some state policies may inadvertently be deterring investment in rooftop and other non-greenfield projects, such as the practice of compensating community solar projects at the same net metering rate regardless of their cost to produce electricity. That agnostic approach to pricing puts rooftop and other beneficial projects at a competitive disadvantage, even if they are economically viable at the net metering rate. Enacting the tax exemption would reduce some of those profit disparities and promote a more diverse supply of in-state solar generation.

AHB also believes that the tax provision would be more effective if the bill were amended in two ways. First, we recommend terminating eligibility for the tax exemption five years after enactment to allow lawmakers to reassess market conditions, evaluate the effectiveness of the exemption, and consider the effects of any changes in regulatory framework for the community solar program after the pilot program expires in 2024. Second, we suggest revising the eligibility criteria to exclude existing projects. Limited public funds should only be used for projects that need the financial incentives to be competitive.

Thank you for considering our views. Please contact us if we can be of assistance on these issues.

[1] The Advocates for Herring Bay, Inc. is a community-based environmental group in Anne Arundel County.
[2] See: https://rebusinessonline.com/baltimores-industrial-market-is-stronger-than-ever-and-theres-more-to-come/

SB0528_khoffman_fav.pdf
Uploaded by: Kirsten Hoffman
Position: FAV

GREEN TOWSON ALLIANCE

February 14, 2022

SB0528 Climate Solutions Now Act of 2022 - Favorable
Kirsten Hoffman for the Green Towson Alliance

Chair Pinsky, Vice Chair Kagan and Honorable Members of the Education, Health, and Environmental Affairs Committee,

The Green Towson Alliance (GTA) writes in support of SB0528 Climate Solutions Now Act of 2022. We are a coalition of environmentalists who advocate for a greener, healthier, more beautiful community in Baltimore County. While our work focuses mainly on the Towson area, we are very concerned with the impacts of climate change that affect all Marylanders.

Towson is currently shown as a heat island on the NOAA Urban Heat Island study. As our community continues to grow and we see new construction and more cars on our roads, the heat island effect will only worsen. GTA advocates for the planting of urban street trees and the construction of energy-efficient buildings to help mitigate climate change at our local level. We request that the state now does its part by passing comprehensive climate legislation to reduce carbon emissions, achieve net-zero emissions by 2045 and to electrify the building and transportation sectors across our state. Additionally, we need to make sure climate justice is at the forefront of climate policy. We have seen the impacts of climate injustice at work in East Towson and we have been involved with advocating for responsible - not harmful - development there.

We have no time to waste. Maryland is one of the most vulnerable states in the nation to the effects of global warming, with flooding and record-breaking heat already regular occurrences. We urgently need bold leadership now to put our state on a path to a sustainable future.

Please give your support to the passage SB0528.

Respectfully,

Kirsten Hoffman
for the Green Towson Alliance

LaurenBrown_Testimony.pdf
Uploaded by: Lauren Brown
Position: FAV

February 15, 2022

Sen. Paul G. Pinsky, Chair
Senate Committee on Education, Health and Environmental Affairs
West Miller Senate Building, Room 2
Annapolis, Maryland 21401

Re: **SUPPORT** – SB528 – CLIMATE ACTION NOW ACT of 2022

Dear Chairman Pinsky and Members of the Committee:

I am a long-term Maryland resident and a student at John Hopkins University pursuing my master's in Public Health with a concentration in global environmental sustainability and health. I am very concerned about climate change and am dedicated to doing everything I can to help Maryland move to net zero emissions. I am a strong supporter of SB528 because it provides a viable mechanism to reduce greenhouse gas emissions in the state of Maryland. It mandates that Maryland meet net-zero greenhouse gas emissions by 2045 and reduce emissions by 60 percent by 2030, using 2006 measures as the baseline. It is essential that we pass SB528 this session and start implementing climate reduction strategies as soon as we can.

I believe this bill is a necessary step to transition to a cleaner and more efficient energy sector, with provisions to help low-income families and households. In Maryland, the building sector is the largest consumer of energy, accountable for approximately 90% of the energy use. This bill takes many steps toward reduce greenhouse gas emissions from the buildings sector, including creating the Climate Catalytic Capital Fund and the Building Energy Transition Plan Task Force. The Building Energy Transition Plan Task Force has the responsibility to develop a plan for financially supporting retrofitting of certain buildings. Maryland needs to transition to electrified buildings. SB 528 includes specific energy efficiency requirements and building emission standards which is one of its key strengths.

From my studies and research, I have come to understand the importance of the transition to clean energy. As scales of economies increase, renewable energy will become more and more cost-effective. I believe the Maryland legislature should incentivize the use of renewable energy, especially for low-income residents. This bill does that by setting up personal property tax exemptions for solar equipment and shares in community solar. The bill also calls for the installation of solar energy systems and installation of electric vehicle charging equipment. In addition, the bill establishes zero emission vehicle standards for the State vehicle fleet and school buses.

SB 528 creates a framework to help reduce greenhouse gas emissions in specific ways across sectors, including building electrification, transition to clean energy, and supporting electric vehicles. This is an opportunity for Maryland to lead in energy efficiency infrastructure and programs as well as in racial and environmental justice.

Respectfully Submitted,

Lauren Brown

sb528, climate solutions now 2022.pdf
Uploaded by: Lee Hudson
Position: FAV

Delaware-Maryland Synod
Evangelical Lutheran Church in America
God's work. Our hands.

Testimony prepared for the
Education, Health, and Environmental Affairs Committee
and
Budget and Taxation Committee
on
Senate Bill 528
February 15, 2022
Position: **Favorable**

Mr. Chairman and members of the Committee, thank you for the opportunity to advocate for good stewardship of creation. I am Lee Hudson, assistant to the bishop for public policy in the Delaware-Maryland Synod, Evangelical Lutheran Church in America. We are a faith community in three ELCA synods in every part of our State.

The ELCA identified greenhouse gases as pollutants because of their deleterious effects on climate in 1993. ("Caring for Creation," ELCA 1993 assembly) As a member of the Lutheran World Federation, a global communion of churches, the ELCA is urged to advocate, with faith colleagues and civil society partners and committed peoples, "environmental care and protection." (LWF assembly, 2017)

As greenhouse gas emissions surpass what the known environment will tolerate, food, safety, civic and economic life are at risk everywhere. Earth's atmosphere, soils and seas are not subdivided by national boundaries.

The human community must now rapidly develop and deploy policies that can diminish the catastrophic occurring regularly all around us. The cost of attending to climate disaster already exceeds the cost of policy adjustment. That calculation only gets worse from now on. We're financing fixes for what our energy regime is destroying.

We support accelerating the rate at which renewables are brought into the energy market to scale new, clean generation capacity.

We support recruiting State finance, capital expenditure, and procurement to meet a net-zero emission standard. The public investment will benefit everyone and every part of the State commons and public good.

We support using available efficiency technology to reduce current energy consumption.

We support hedging risk for communities and locations vulnerable to the deleterious climate effects plainly observable.

We support more restrictive allowances for greenhouse gas emissions.

We support accelerating the rate at which GGRs are achieved.

Because the time to transition to a different energy regime is nearly up, we support **Senate Bill 528**. We implore your favorable report.

Lee Hudson

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sb 528 Climate Solutions 2022 pdf 1.pdf
Uploaded by: Linda Boyd
Position: FAV

THE EPISCOPAL DIOCESE OF MARYLAND

SUPPORT
SB 528
Climate Solutions Now Act of 2022
Education, Health and Environmental Affairs Committee
2/15/2022

Chairman Pinsky, Vice Chair Kagan, members of the Education, Health, and Environmental Affairs Committee, my name is Rev. Linda Boyd and I submit this testimony on behalf of the Episcopal Diocese of Maryland. The Maryland diocese represents 110 parishes and over 45,000 parishioners. The Episcopal Diocese of MD supports SB 528.

We believe that God calls us to care for creation and to support policies that promote a healthy environment. This Bill recommends that Maryland achieve net-zero statewide greenhouse gas emissions by 2045. The bill will also require a 60% reduction in greenhouse gas emissions below 2006 levels by 2030. The measures proposed by this Bill take considerable steps toward reducing greenhouse gas emissions and thereby providing a healthy environment for all Marylanders, and toward protecting God's creation, planet Earth. Ensuring healthy communities expresses our love for our neighbors and helps to promote a world in which all individuals in Maryland can live and flourish.

The Episcopal Church calls for policies that mitigate greenhouse gas emissions, promote sustainable energy, the safe and just use of natural resources, and supports communities impacted by a lack of environmental stewardship. Reducing greenhouse gas emissions and improving air quality aligns with the broader environmental equity and social justice goals around Creation Care supported and encouraged by the Episcopal Church.

We encourage a favorable report.

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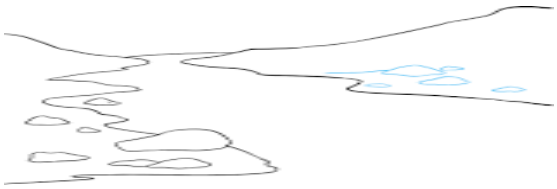
www.EpiscopalMaryland.org

GEHM testimony.528.support.pdf
Uploaded by: Lisa Hemmer
Position: FAV



GLEN ECHO HEIGHTS MOBILIZATION

Committee: Education, Health & Environmental Affairs
Testimony on: SB528 - "Climate Solutions Now Act of 2022"
Organization: Glen Echo Heights Mobilization
Submitted By: Lisa Hemmer, Member
Position: Favorable
Hearing Date: February 15, 2022

Glen Echo Heights Mobilization – a community organization in Montgomery County Maryland with 50 members or more -- submits testimony in support of SB528, a bill that would establish targets for greenhouse gas reductions and net zero emissions in Maryland by 2045.

The ambitious Climate Solutions bill has provisions too numerous to recount here but, *inter alia*, includes terms that:

- Require adoption of landfill methane emissions standards equivalent to California's standards by 2024
- Compel state agencies to consider greenhouse gas reduction and climate impacts in decision-making
- Develop a Climate Justice Corps that would provide jobs for young people by mobilizing, educating and training them to deploy clean energy technology that, in turn, would mitigate and prevent environmental and health impacts of climate change on disproportionately affected communities
- Provide opportunities for funding of mandatory electric school bus purchasing
- Establish a new definition for "high performance buildings," establish a NZE School Grant program, and establish GHG standards for new and existing buildings
- Ensure equitable involvement of all communities in its implementation.

We support this legislation for the following reasons:

- In August 2021, the Intergovernmental Panel on Climate Change declared a "code red for humanity" due to rapidly worsening climate change. Its report declared that the planet has delayed curbing their fossil-fuel emissions for so long that the sort of impacts that the planet is experiencing from extreme storms, fires and floods, and heatwaves will continue. Nonetheless, there is a short window for preventing the most harrowing future.
- **The bill would acknowledge science and the Intergovernmental Panel's Report by requiring recognition of the impacts of climate change in government decision-making and setting a goal for net-zero emissions, while at the same time focusing on equity and jobs.**

Conclusion. This bill ensures Maryland's commitments toward environmental sustainability. We urge a favorable report by this Committee.

SB528 -Climate Solutions Now Act 2022-Education, H

Uploaded by: Maureen Fine

Position: FAV

Committee: Education, Health, and Environmental Affairs
Testimony on: SB528-Climate Solutions Now Act of 2022
Organization: Greenbelt Climate Action Network
Submitting: Maureen Fine
Position: Favorable
Hearing Date: Feb.15, 2022

Dear Chairman and Committee Members:

The Greenbelt Climate Action Network (GCAN) is writing in support of SB528-Climate Solutions Now Act of 2022.

GCAN's mission is to educate residents about climate change, "systemic" solutions, how they can change their behaviors to be more sustainable, and take personal, local, systemic, and political action.

The Climate Crisis will only get worse, and we're running out of time. EPA tells us the next decades will bring Maryland increased inland and coastal flooding; it will disrupt fishing and farming; and it will increase risks to human health. Rising temperatures have already weakened our seafood and tourism industries. And, Maryland ranks #4 in the nation when it comes to premature deaths from dirty energy created pollution.

We want Maryland to be a Climate Leader. **SB528 is the big, bold climate solution that Maryland needs!** It increases our greenhouse gas reduction targets to 60% by 2030 and net zero by 2045. It establishes and provides an initial appropriation for a Climate Catalytic Capital Fund to fund more climate pollution reduction programs focused on investments in Environmental Justice communities. It also establishes a Just Transition Employment and Retraining Task Force, electrifies the state vehicle fleet, and funds a net zero school program.

For the buildings sector, it establishes high-electrification construction code for new building beginning in 2023, so we start building greener buildings, and also establishes a Building Emissions Performance Standard for buildings 25,000 sq. ft and larger that reaches 20% reductions in 2030, 40% by 2035, and Net-zero by 2040. Finally, it creates an inter-agency task force to develop a plan to fund holistic retrofits in the building sector to meet the new 2030 and 2045 state greenhouse gas reduction targets.

For all these reasons, we recommend a FAVORABLE report for SB528- Climate Solutions Now Act of 2022 in committee.

Sincerely,
Maureen Fine
Volunteer
Greenbelt Climate Action Network

SB_528_Favorable_Testimony.pdf
Uploaded by: Michael Loll
Position: FAV

SB 528 - Climate Solutions Now Act of 2022

Testimony before Education, Health, and Environmental Affairs Committee

February 15, 2022

Position: Favorable

Mr. Chair, Ms. Vice Chair and members of the committee, my name is Michael Loll, and I am a member of the Green Team of St. John the Evangelist Roman Catholic Church in Columbia, MD. I am providing written testimony today in ***strong support of SB 528*** in accordance with the position taken by the Roman Catholic Church on climate change, and its disparate effects on the poor and marginalized.

The obvious effects of climate change have been documented for years – sea level rise, flooding, heat waves, and so on. But there are other direct effects that get less attention in the media, yet still have significant impacts. Burning fossil fuels increases the incidence of asthma and heart attacks. It is no accident that asthma rates in Baltimore, with its confluence of interstates and industry, has a higher asthma rate than the surrounding suburbs. Nor is it an accident that many of the asthma afflicted residents of Baltimore are poor minorities. These are the groups the Church calls us to support.

On a personal note, my mother suffered from asthma. For those who have never seen one, a full blown asthma attack is one of the most terrifying events a person can witness. Imagine what it is like for the sufferer.

For the reasons listed above, this is why I stand with Pope Francis and the stand he outlines in his encyclical, *Laudato Si'*.

Thank you for your time and attention.

On behalf of the Green Team of St. John's, I encourage a favorable report.

Thank you for your time and attention.

Michael Loll

Columbia, Maryland

SB 528 Climate Solutions Now Act of 2022 (Favorabl
Uploaded by: Michelle Dietz
Position: FAV

The Nature Conservancy
Protecting nature. Preserving life.

The Nature Conservancy
Maryland/DC Chapter
425 Barlow Pl., Ste 100
Bethesda, MD 20814

tel (301) 897-8570
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nature.org

Tuesday, February 16, 2022

TO: Paul Pinsky, Chair of Senate Education, Health, and Environmental Affairs Committee; Guy Guzzone, Chair of Senate Budget and Taxation Committee; and Committee Members
FROM: Michelle Dietz, The Nature Conservancy, Director of Government Relations; and Cait Kerr, The Nature Conservancy, Conservation & Climate Policy Analyst
POSITION: Support SB 528 Climate Solutions Now Act of 2022

The Nature Conservancy (TNC) supports SB 528 offered by Senator Pinsky. In Maryland, TNC's work focuses on delivering science-based, on-the-ground solutions that secure clean water and healthy living environments for our communities, reducing greenhouse gas emissions and increasing resilience in the face of a changing climate. TNC has an institutional goal to help to reduce emissions by avoiding or sequestrating 3 billion metric tons of carbon dioxide per year by 2030. We are dedicated to a future where people and nature thrive together.

SB 528 seeks to increase Maryland's emissions reduction goals to 60% by 2030 and targets a carbon-neutral economy by 2045. This presents us with an opportunity to demonstrate our state's ambition and commitment when it comes to approaching climate change head-on. In addition to setting overall state goals, this bill addresses the major carbon emitting sectors in Maryland through establishing clear targets and goals to achieve emissions reductions within these sectors.

The buildings sector is one of the largest carbon emitting sectors in our state. This past year, TNC participated in a work group to inform recommendations in the Maryland Climate Change Commission's Building Energy Transition plan, which aims to decarbonize residential and commercial buildings across the state. The Climate Solutions Now Act builds upon this plan's recommendations to set Maryland on a clear path toward significant buildings sector emissions reductions. This bill requires state-owned buildings to meet 50% reduction in greenhouse gas emissions by 2030 and to be net-zero by 2035. Public buildings are set to follow with a 20% reductions goal by 2030, 40% reductions by 2035, and meeting net-zero requirements by 2040. Establishing the Building Energy Transition Implementation Task Force will make meeting these targets possible; this Task Force will study and make recommendations on how best to retrofit buildings and reduce buildings' emissions. New construction will be required to include electric-ready standards to support renewable energy systems. Renewable energy sources and a clean energy economy are an essential part of reaching state, national, and global low-carbon energy goals and combatting the negative health and environmental impacts caused by fossil fuels.

The Climate Solutions Now Act also addresses the transportation sector, which is the largest contributor to emissions in our country, our region, and in Maryland. It accounts for approximately 40% of greenhouse gas emissions statewide, predominately from on-road sources. Gas and diesel-powered vehicles emit air pollutants that harm pulmonary and cardiovascular health. Nitrogen oxides from fossil fuel combustion are precursors of ground level ozone, which trigger asthma attacks. These dangerous health risks disproportionately impact Black and brown communities and low-income neighborhoods. Eliminating emissions from state-owned vehicles will protect public health by reducing the risks from air pollution and will subsequently reduce households' healthcare costs. The Climate Solutions Now Act requires 25% of state-purchased passenger cars to be zero-emissions vehicles by 2023; this increases to 100% of state-purchased passenger cars by 2027. Under this legislation, all state-purchased light-duty vehicles are to be zero-emissions vehicles starting in 2028, with a

100% zero-emissions fleet by 2033. Addressing the state's contribution to the transportation sector's overall emissions is an important step toward achieving statewide climate targets as well as protecting public health.

TNC commends Senator Pinsky and the co-sponsors for continuing to raise the bar for Maryland's climate commitments and advancing climate solutions that can provide valuable environmental, economic, and public health co-benefits for years to come.

Therefore, we urge a favorable report on SB 528.

Jeffries Climate Solutions Now SB528 Senate Favora
Uploaded by: Nina Jeffries
Position: FAV

Testimony in Support of SB528 - Climate Solutions Now:

Good afternoon Senator Pinsky and members of the Education, Health, and Environmental Affairs Committee,

My name is Nina Jeffries, I'm a native Marylander and student climate activist. We need Climate Solutions Now.

Climate change is terrifying. I just turned 22 in December, and I can already see the effects of climate change in my lifetime. Maryland is the 15th most at-risk state for heat impacts from climate change, by 2050 we will average almost 6 times more heat index days than in 2000. [1] [2] I can attest to this heat danger. Since starting college I've worked seasonally in agricultural jobs - first on-campus in our arboretum and most recently managing an urban farm in Temple Hills. Each summer I experience heat-related illness, no matter how much water I'm drinking, how early I start work, or how I pace myself. It is simply too hot to work safely outdoors. On multiple occasions this summer while I was working alone I felt so woozy I couldn't make it back to my car. I had to crawl into the shade and wait for the dizziness and weakness to pass.

And I'm young and healthy. Heat impacts will be the biggest cause of deaths associated with climate change. For children, older folks, or those with preexisting health conditions - the heat increase will be deadly.

We need Climate Solutions Now to mitigate climate change to support human and environmental health, and environmental and economic justice:

- We need to reduce GHG: CSN would reduce greenhouse gas emissions 60% by 2030 and achieve net-zero emissions by 2045
- We need to accurately account for methane, a GHG much more potent that CO2: CSN will update reporting and accounting for methane
- We need to provide young people with high-quality and high-impact jobs: Climate Justice Corps for young adults to enter green jobs and help Maryland reach its GHG reduction goals
- We need to support environmental and economic justice: the Climate Catalytic Capital Fund to support projects to reduce GHG emissions in overburdened and underserved communities

Climate change is hijacking the lives of youth. We must pass Climate Solutions Now.

Thank you.

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[1] https://climatecheck.com/maryland

[2] https://statesatrisk.org/maryland/all#:~:text=The%20New%20Normal%3A%20Earth%20is%20Getting%20Hotter&text=Nearly%20110%2C000%20people%20living%20in,40%20danger%20days%20a%20year.

2022 Senate Bill 528 - Goodwin Testimony.pdf

Uploaded by: Peter Goodwin

Position: FAV

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Senate Bill 528: Climate Solutions Now Act of 2022

Education, Health and Environmental Affairs:
Chair: Senator Paul G. Pinsky. Vice-Chair Cheryl C. Kagan

Testimony from:
Peter Goodwin: President, University of Maryland Center for Environmental Science
Chair, MCCC Science and Technical Working Group

Thank you for the opportunity to testify in support of SB528. I will make just 3 points.

The Committee is very aware that Maryland today is already witnessing many consequences of climate change as highlighted in the Maryland Commission on Climate Change 2021 Annual Report. The urgent need for action is described by many sources that have been rigorously vetted and peer reviewed, including:

- In 2020, over 10,000 scientists from 153 countries signed on to an open letter[1] describing the climate emergency and urging immediate action.
- The Physical Basis Report[2] of the IPCC released in August 2021 issued a CODE RED warning. More than 800 scientists participated in synthesizing over 14,000 scientific studies and publications over 6 years to draw conclusions that are defensible, relevant and disturbing.

A target has been established to limit global warming to 1.5ºC above pre-industrial levels. Failure to restrict global warming to 1.5ºC will result in more severe weather events and extremes (*high confidence*). Many ecosystems will reach a tipping point of unpredictable change due to complex feedback mechanisms that are not fully understood. These changes will make it difficult and more costly for us to adapt our economies, modify infrastructure or give ecosystems and species the chance to adapt.

To achieve this 1.5ºC target, globally we need to be 45% below 2010 greenhouse gas emission levels by 2030 and reach net zero by 2050 [2,3]. At the 2020 levels of emissions we will cross this threshold in only 10 years. **Therefore, SB528's goal of achieving Net-Zero by 2045 highlights Maryland's willingness to lead the governments across the globe.**

Secondly, engineering and technological innovation will make a significant contribution in the coming decades but we need to start taking steps now with what we have. **We need to ensure that investments, either public or private, made today are able to integrate advances in energy sources, efficiencies and enhancements implemented by communities. This is particularly important in electrification of transportation systems and buildings.** The proposed Climate Transition and Clean Energy Hub as a clearing house for information on advanced technology and architectural could reduce the time for implementation. This is a

rapidly advancing field and a central focal point can harness the deep expertise in Maryland across agencies, engineering and consulting firms, NGOs, universities as well as existing Councils and Commissions.

The third comment is regarding Maryland's Commission on Climate Change (MCCC). There are some excellent examples of systems tracking progress related to Climate Change, including Maryland's first-ever 2021 Coastal Adaptation Report Card led by UMCES. For the MCCC, Maryland should be proud of the many organizations and individuals who donate thousands of hours each year to the Commission's work for meetings, supporting the Working Groups and task forces set up to explore specific issues. This structure represents the people of Maryland, business interests, agencies, NGOs and universities and is supported by outstanding scientists, engineers and planners in our state agencies. Significant progress was made in 2021 and the MCCC committed to an annual tracking of MCCC recommendations.
The implementation of MCCC recommendations should be given significant consideration either through Executive Branch or State legislative action, where appropriate.

References

1. Ripple, W.J. et al., 2020. World Scientists' Warning of a Climate Emergency. *BioScience*, Volume 70, Issue 1, 8-12. 12, https://doi.org/10.1093/biosci/biz088
2. IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press.
3. Han, G. and J. Holmes, 2021, Climate Transparency Report: Comparing G20 Climate Action Toward Net Zero. 16p. www.climate-transparency.org

SB 528_Maryland Catholics for Our Common Home_FAV.
Uploaded by: Robert Simon
Position: FAV

Maryland Catholics for Our Common Home

Responding to the cry of the Earth and the cry of the poor.

Hearing before the Senate Education, Health, and Environmental Affairs Committee
Maryland General Assembly
February 15, 2022

Statement of Support (FAVORABLE)
from Maryland Catholics for Our Common Home on
SB 528, the Climate Solutions Now Act of 2022

Maryland Catholics for Our Common Home (MCCH) is a lay-led organization of Catholics from parishes in the three Catholic dioceses in Maryland: the Archdiocese of Baltimore, the Archdiocese of Washington, and the Diocese of Wilmington. It engages in education about, and advocacy based on, the teachings of the Catholic Church relating to care for creation. MCCH is a voice for the understanding of Catholic social teaching held by a wide array of Maryland Catholics, but should be distinguished from the Maryland Catholic Conference, which represents the public policy interests of the bishops who lead these three dioceses.

MCCH would like to express its strong support for passage of Senate Bill 528, the Climate Solutions Now Act of 2022. As Catholics, we see care for God's creation as an integral part of our faith, as taught by recent Popes, including the forceful statements of Pope Francis. The Climate Solutions Now Act of 2022 embodies this broad moral vision. The bill's focus on urgent and comprehensive action to address the climate crisis is consistent with Pope Francis's stated view that this crisis constitutes an emergency. Its focus on action that will benefit Maryland's low-wealth communities and communities of color is an appropriate response to the disproportionate impacts of pollution and climate change on these communities.

MCCH's position in favor of the Climate Solutions Now Act in last year's session of the General Assembly was supported by individual endorsements by well over 200 Maryland Catholics, who were members of 41 different parishes across the three dioceses, and who lived in 33 of Maryland's 47 Senatorial legislative districts. This list of strongly committed Catholics included many who are active leaders in their parishes, religious orders, and wider communities. MCCH is collecting similar individual endorsements this year and expect to be able to show both broad and deep support for this bill among Maryland Catholics during the course of this session.

Thank you for your consideration of our view and our respectful request for a **favorable** report on Senate Bill 528.

GHHI Written Testimony-SB528.pdf
Uploaded by: Ruth Ann Norton
Position: FAV

Green & Healthy Homes Initiative®

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February 14, 2022

Senator Paul G. Pinsky, Chair
Senate Education, Health and Environmental Affairs Committee
2 West
Miller Senate Building
Annapolis, Maryland 21401

Re: **SUPPORT** – SB528 – CLIMATE SOLUTIONS NOW ACT of 2022

Dear Chairman Pinsky and Members of the Committee:

On behalf of the Green & Healthy Homes Initiative, I offer this testimony in support of SB528. GHHI is a member of Energy Efficient Maryland, the Maryland Public Health Association Advisory Committee, and the New York State Climate Action Council Energy Efficiency and Housing Advisory Panel. In addition, I represent GHHI as a member of the EPA Children's Health Protection Advisory Committee and the Maryland Lead Poisoning Prevention Commission. GHHI is dedicated to addressing the social determinants of health and the advancement of racial and health equity through the creation of healthy, safe and energy efficient homes. The Green & Healthy Homes Initiative (GHHI) has been at the frontline of holistic healthy housing for over three decades.

Over its 30-year history, GHHI has developed the holistic energy efficiency, health and housing service delivery model that is implemented in our nationally recognized, Maryland-based direct services program. The model was adopted by the U.S. Department of Housing and Urban Development and is currently being advanced in partner jurisdictions nationally. In addition, GHHI helped to elevate Maryland as a national leader in healthy housing by helping reduce childhood lead poisoning by 99% in the state and helping design over 45 pieces of healthy housing legislation that became law in the State of Maryland and local jurisdictions. By delivering a standard of excellence, GHHI aims to eradicate the negative health impacts of unhealthy housing to ensure better health, economic, and social outcomes for children and families with an emphasis on black and brown and low-income communities. Most recently, GHHI's holistic approach was specifically cited by HUD as model for effective coordination of federal healthy homes and weatherization programs and resources.

Through our own research and evidence-based practice, GHHI has found that a healthy and energy efficient home yields a multitude of energy and non-energy benefits for residents, particularly low-income residents who can benefit the most from such energy efficiency

improvements in terms of economic mobility, housing stability and wealth attainment over the long-term. We are deeply committed to advancing racial and health equity, economic mobility and climate resiliency through efficiency standards, electrification and decarbonization for low-income housing, and write in support of SB528 which is critical in the effort to advance energy equity and reduce climate impacts as well as addressing home health and energy efficiency gaps for Maryland's low-income families and communities.

What will SB528 Do?

- Creates a **Climate Catalytic Capital Fund (Green Bank)** to:
  - support improvements in energy management and efficiency to reduce greenhouse gas emissions from the buildings sector
  - implement energy and weatherization measures for low- to moderate-income households

- Creates a **Building Energy Transition Plan Task Force** to:
  - study and make recommendations on complementary programs, policies, and incentives to reduce greenhouse gas emissions from buildings,
  - develop a plan for funding the retrofit of covered buildings to comply with building emissions standards

- As part of the **recommendations** from the Transition Plan TF, the following may be put into place:
  - commercial tax credits or direct subsidy payments for building decarbonization projects
  - financial incentives through EmPOWER and other state programs to support all aspects of the transition to electrified buildings
  - low-income household holistic retrofit targets and heat pump sales targets
  - use of options such as on-bill, low interest financing to spread out the up-front costs, associated with electrification retrofit upgrades

- In addition, several provisions of the bill call for standards and incentives to advance clean energy goals, including:
  - Building Emissions Standards for new construction
  - Requirement for state buildings, public schools and community colleges to meet high performance building standards
  - Personal property tax exemptions for solar equipment and shares in community solar

Why is SB528 Needed?

In Maryland, the building sector is responsible for about 90% of the energy consumption statewide. SB528 includes a broad array of policy solutions, innovative funding mechanisms and

opportunities for alignment and collaboration, totaling nineteen separate actions that will advance racial equity and environmental justice and meet Maryland's climate goals. Based on our decades of work serving families and improving housing conditions in Maryland, GHHI recognizes the important role of housing in achieving the state's climate goals and improving health, economic and social outcomes for our most vulnerable families.

The need for energy solutions for Maryland's low-to-moderate income housing stock is clear. Throughout our state, low-income residents face disproportionately higher utility bills. As a proportion of total income, low-income residents in the state of Maryland pay 550% more as a portion of income for energy than non-low-income residents in the state. Some low-income Marylanders devote such an extremely high share of their income to energy services that up to 42 cents out of every dollar is spent on energy bills (APRISE: Applied Public Policy Research Institute for Study and Evaluation, 2018). Every dollar that low-income residents allocate to costly utility bills is a dollar that cannot be used on other household essentials ranging from affording medical bills and school supplies to food (APRISE: Applied Public Policy Research Institute for Study and Evaluation, 2018).

Approximately 55% of Maryland's low-income households include Asian, Hispanic or Black residents. These residents have less access to affordable, energy efficient and healthy homes (Lucy Laflamme, N.D.). These disparities persist across the state, characterized by energy inefficient homes and health hazards like lead-based paint, leaky roofs, poor indoor air quality and mold. These conditions often cause DHCD to defer energy efficiency service delivery until all health and safety hazards are addressed. Deferral technically means that the services will be delivered eventually but most deferred cases never get the upgrades because there are not sufficient resources to help low-income households address the hazards themselves. EmPOWER has a $1,000 health and safety budget per unit that can be used to perform pre-energy efficiency hazard remediation, but in many cases, this budget is not large enough to address all health and safety issues.

Though the Climate Solutions Now bill presents specific actions across a number of sectors, GHHI is mission-driven to support the following specific elements of the bill:

- Development of energy efficiency and electrification requirements for certain buildings
- Establishment of certain personal property tax requirements
- Establishing the Climate Catalytic Capital Fund
- Requiring the Department of the Environment to establish building emissions standards for certain buildings
- Requiring the Maryland Department of Labor to update the Maryland Building Performance Standards
- Altering the duties of the Maryland Green Building Council
- Establishing the Building Energy Transition Implementation Task Force to study certain matters and develop a plan for funding the retrofit of certain buildings.

Specifically, GHHI is in support of the following proposed actions, in direct alignment with our mission and vision to create healthy, safe, energy efficient and decarbonized homes for Maryland families:

Climate Catalytic Capital Fund (Green Bank; page 5 of bill)

- Funding will be allocated from the state budget, private funds, federal grants and programs, profits from collateral and interest and other sources, to sustainably support this fund.
- The purpose of the fund related to buildings includes:
    - Enabling improvements in energy management and efficiency to reduce greenhouse gas emissions from the buildings sector
    - Target the implementation of energy and weatherization measures for low- to moderate-income households

Building Emission Standards (page 46 of bill)

- Develops building emissions standards that achieve specific reductions in greenhouse gas emissions, including:
    - State-owned buildings:
        - 50% reduction in net greenhouse gas emissions before 2030
        - net-zero greenhouse gas emissions before 2035
    - Private buildings
        - 20% reduction in net greenhouse gas emission before 2030
        - 40% greenhouse gas emission before 2035
        - Net-zero before 2040
    - Requires owners to measure and report direct emission to department beginning 2025
    - Provides maximum flexibility to owners to comply
    - Includes alternative compliance pathways by paying a fee greater than equal to the social cost of carbon
    - Puts forward financial incentives as recommended by Building Energy Transition Implementation task force

Building Energy Transition Plan Task Force (page 49 of bill)

- Mandates creation of the task force staffed by Government positions, governor appointed positions in non-profit, business, and contracting
- Charges the task force with:
    - Studying and making recommendations on complementary programs, policies, and incentives to reduce greenhouse gas emissions from buildings by 2023
    - Developing a plan for funding the retrofit of covered buildings to comply with building emissions standards
- Potential recommendations listed in the bill include:

- Commercial tax credits or direct subsidy payments for building carbonization projects
- Creation of financial incentives through EmPOWER and other state programs to support all aspects of the transition to electrified buildings
- The establishment of low-income household holistic retrofit targets and heat pump sales targets
- The use of options such as on-bill, low interest financing to spread out the up-front costs, associated with electrification retrofit upgrades

Additional provisions in the bill that GHHI supports include:

Buildings Emissions Standards (page 23 of bill)

- Sets a deadline of January 1, 2023 for new buildings to meet all water and space heating demands without the use of fossil fuels
- Requires new buildings meet electric-ready standards, including
  - Installation of solar energy systems
  - Installation of electric vehicle charging equipment
  - Building-grid interactions
- Exemptions if local jurisdiction determines in state-approved cost effectiveness test that incremental cost of constructing the building to standards would be greater than the social cost of greenhouse gas reduction.
  - Requires the use of a specific cost effectiveness test:
    - Use greater of either the rate by the MD Dept of Environment of US EPA
    - Account for projected utility costs rates and emission rates based on the most recent final green house gas emission reduction plan adopted
  - Requires that buildings granted variances must still be electric ready
- Requires localities to adopt International Green Construction Code 2018 and subsequent updates within 18 months after issue

High Performance Buildings (page 37 of the bill)

- Adds criteria of Silver LEED certification or school or public safety building that achieves certified rating and based on location, including 5 pts or fewer in the combined credits for access to quality transit and surrounding density and diverse uses
- Requires buildings to meet or exceed requirements for certification under US green buildings councils LEED zero energy program OR achieves net zero by MD standards.
- Sets a state project standard for capital projects are those funded at least 25% with state funds (previous standard was those solely funded)
- Requires state buildings, public schools, and community colleges to meet high performance building requirements
- Develops guidelines for evaluating the energy balance and achieving a net-zero energy balance in buildings subject to statute 3-602.1

Personal Property Tax (page 46 of the bill)

- Exempts property that is machinery or equipment that is
  - Installed on rooftops, parking lots, roadways, or brownfield sites and is part of a community solar energy generating system that serves more than 51% of Kw/h to LMI customers

Benefits of providing low-income households with energy efficiency upgrades and building decarbonization

Energy efficiency, weatherization and decarbonization interventions provide not only energy benefits, related to reductions in energy usage and costs, but also non-energy benefits as well. Non-energy benefits are "the wider socio-economic outcomes that arise from energy efficiency improvement, aside from energy savings". Studies have shown that energy efficiency and weatherization can improve housing conditions relating to thermal comfort, indoor air quality, pest management, and fire safety. Furthermore, household energy efficiency upgrades can spur community benefits such as economic growth, neighborhood revitalization, and resilience. These investments can help to support and stimulate the local economy by providing families and individuals with greater disposable income, which can help alleviate poverty and increase purchasing power while generating more local jobs (Bell 2014; IEA 2014). One study found that between 9 and 13 gross jobs are generated per every $1 million investment. By targeting energy efficiency upgrades at low-income households with SB528, all Marylanders will benefit.

The Climate Solutions Now Act also has tangible implications for racial equity. In the US, Black households have the greatest likelihood of residing in older homes with compromised energy systems, aging or ineffective appliances and other assorted structural deficiencies, all of which contribute to making the home energy inefficient (Diana Hernández Yumiko Aratani Yang Jiang, 2014; Diana Hernández, Yang Jiang, Daniel Carrión, Douglas Phillips, and Yumiko Aratani, 2016). Residential segregation, racist housing policies and intentional disinvestment in communities of color, including in Maryland, result in conditions that contribute to poor health and high energy burdens, including inadequately sustained and inefficient ventilation (HVAC), cooling and heating systems, drafts or air leaks, and poor insulation (Ariel Drehobl and Lauren Ross, 2016; Diana Hernández and Douglas Phillips, 2015; Tony Gerard Reames, 2016; United States Census Bureau, 2015).

These structural conditions, coupled with a household's inability to obtain energy – independent systems within higher quality homes, all contribute to increased costs for fundamental home utilities such as cooling and heating systems and lighting, through inefficient household energy usage (Jamal Lewis, Diana Hernández & Arline T. Geronimus, 2019).

In addition, data demonstrates that Black households are disproportionally subjected to trade-offs, for instance choosing between paying energy expenses or food and medicine, with 28% of

Black households reporting having waived food and medicine monthly in order to pay for energy, (James Berry, Independent Statistics & Analysis: U. S. Energy Information Administration, 2018). Investigations have revealed how challenges central to energy insecurity, including difficulties paying energy bills or experiencing reduced thermal comfort, were connected to raised stress levels, known to be damaging to long term health when chronically sustained (Arline T. Geronimus, 2000; Diana Hernández, 2016).

Decarbonization slows the pace of climate change which affects the health, safety, and economy of the entire population. As a coastal state, Maryland is on the front lines of many of the project dangers of climate change, and within the state these impacts are projected to affect the most vulnerable populations disproportionately (Maryland 2030 GGRA Plan 2021). Over the next 30 years, the increased flood risk from climate change is modelled to disproportionately affect low-income Black communities in Maryland and across the country (Wing et al. 2022). Furthermore, extreme heat and weather events are projected to have the most severe health impacts (e.g. increased hospitalizations from asthma and heart attacks) in the low-income and minority population centers of the state such as Baltimore City (Maryland Climate and Health Profile Report 2016).

Buildings are significant emitters of greenhouse gases that contribute to global climate change as well as particulates that have significant effects on local health. In 2017, buildings accounted for 18% of direct greenhouse gas emissions in Maryland (The 2030 GGRA Plan 2021). Numerous studies have demonstrated a link between particulate ($PM_{2.5}$) levels and premature loss of life. Decarbonization is an essential step to reducing this burden because both nationally and within Maryland, gas emissions have passed coal as the energy source with the largest impact on human health from pollutant emissions (Buonocore et al. 2021). Because buildings emit pollution where people live and work, humans are acutely affected In a major 2012 paper, researchers looked at 35 years of data collected across six US cities and found a statistically significant 14% increase in all-cause mortality for a 10-μg/m3 annual increase in local $PM_{2.5}$ measures, confirming the findings of previous studies (Lepeule et al. 2012; Dockery et al. 1993; Laden et al. 2006). Thankfully, researchers find that community health improves quickly with reductions in $PM_{2.5}$. On the other hand, energy infrastructure is often a long-term investment for both buildings and for municipalities. Beginning the process of decarbonization immediately is the best way to reduce total harm caused to residents' health.

Finally, recent studies have highlighted the health impacts of indoor air pollution from gas appliances. A team of researchers at Stanford University found that stoves emit significantly more methane emissions than previously understood because most of their emissions occur when in their steady state off position (Lebel et al 2022). Furthermore, families who do not use their range hoods or who have poor ventilation can surpass the 1-h national standard of acute NO_2 (100 ppb) within a few minutes of stove usage, particularly in smaller kitchens. Because many

people live in small, older housing, and most appliance remain in use for long periods of time, both the contributions to greenhouse gas emissions and unhealthy levels of indoor air pollution point to a need to prioritize gas-free appliances in most buildings. Preparing buildings for a gas-free operation promotes improvements in indoor and outdoor air quality, as well as allowing a transition off the gas infrastructure which will reduce costs both for energy and gas system maintenance.

How Does Maryland Compare with Other States and Federal Actions?

SB528 presents an opportunity to place Maryland in a position of national leadership in advancing racial, health and energy equity and supporting economic mobility by meeting the critical housing and energy needs of Maryland's most vulnerable families and seniors. State and local governments around the country are moving toward setting clear, statewide standards for building energy efficiency and electrification, and putting in place innovative funding mechanisms to support these standards. In January, 2022 the federal government launched a Coalition of State and Local Governments to Strengthen Building Performance Standards, with the understanding that,

> "When building performance standards are designed in partnership with frontline communities and key stakeholders, innovative and equitable solutions can address multiple needs in a community. Energy efficiency improvements and electrification in multifamily buildings improve indoor air quality, eliminate drafts, and protect residents from extreme heat– delivering health benefits and lower health care costs. For businesses, high-performing buildings are not only good for the world, they are good for the bottom line – attracting higher occupancy rates and generating more revenue."

Maryland can realize these benefits for families, older adults, workers and our environment by enacting the suite of innovative policies within the Climate Solutions Act.
In addition, Maryland will follow states including Connecticut and New York, which have successfully established 'Green Banks' to provide a mechanism for cross-sector private, public and philanthropic investment in clean energy solutions. In each of these states, Green Banks have generated millions in additional capital for building improvements, deep energy efficiency retrofits and clean energy retrofits. We request a favorable report on SB528.

Respectfully Submitted,

DocuSigned by:
Ruth Ann Norton
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Ruth Ann Norton
President and CEO

2022 SB0528 Climate Solutions Now testimony.pdf
Uploaded by: Shari Glenn
Position: FAV

LEAGUE OF WOMEN VOTERS® OF MARYLAND

TESTIMONY TO THE SENATE EDUCATION, HEALTH AND ENVIRONMENT COMMITTEE

SB 528 – Climate Solutions Now Act of 2022

POSITION: SUPPORT

BY: Nancy Soreng, President

DATE: February 15, 2022

The League of Women Voters is a nonpartisan organization that works to increase understanding of major public policy issues and influence public policy through education and advocacy. Action on climate change is based on the League's position to support comprehensive legislation to control climate change, and support for predominant reliance on renewable resources. We are at a critical point that will determine the course of our future forever.

This comprehensive bill ensures Maryland will be part of the new green future by:

- Ensuring Maryland is in line with the current climate science by committing us to a 60% reduction in carbon emissions below 2006 levels by 2030 and to reaching net zero emissions by 2045,
- Calling on the Commission on Environmental Justice and Sustainable Communities to determine the percentage of state funds spent on climate change that must go to environmental justice communities,
- Creation of the Just Transition Employment & Retraining Working Group to protect impacted workers, and
- Providing several mitigation policies.

In Maryland we have a lot at stake, with nuisance flooding, high heat days and storm surges already regular occurrences. There is no more time to delay on meaningful climate action.

The League of Women Voters Maryland encourages a FAVORABLE report for this essential legislation.

121 Cathedral Street, Suite 2B, Annapolis, MD 21401
410-269-0232 * info@lwvmd.org * www.lwvmd.org

NAACP MSC SB 528 Testimony Climate Solutions Now 2

Uploaded by: Staci Hartwell

Position: FAV

NAACP
Maryland
STATE CONFERENCE

SB 528 | Climate Solutions Now Act 2022 February 15, 2022
Senate Committee | Education, Health, and Environmental Affairs
Position | Favorable

Testimony

Good afternoon, Mr. Chairman, committee members and colleagues, my name is Staci Hartwell. I'm the Chair of the NAACP Maryland State Conference, Environmental and Climate Justice Committee, representing the environmental and climate equity interests of our members and BIPOC residents in Maryland.

Seventy-two percent of our population lives in coastal portions of the state. With over 3000 miles of shoreline, our citizens, their homes, and livelihoods are at greater risk form climate change. This exposure could impact $277B of gross domestic product.[1] With more frequent and intense storms and rising temperatures, Maryland, unlike land-locked states, is at ground-zero for the worst impacts of the climate crisis.

Climate Solutions Now builds a strong foundation for our state to take bold action to tackle the climate crisis. It also starts to pave the way for more equitable climate policy. Low-income and communities of color in Maryland bear the brunt of climate impacts – from being overburdened with polluting sources, to having to spend more while earning less for everyday expenses like heating, cooling, and transport from volatile fossil fuel prices.

Over the last two years, the COVID-19 pandemic highlighted how environmental racism has impacted our state. Years of disinvestment and industry in BIPOC communities caused for many communities of color to be overexposed to pollutants that led to increased deaths from COVID.

> Fossil fuel pollution is contributing to the deaths of black and brown people every day and we need to act Now, not next year.

This bill directly works to undo some of the impacts of environmental racism, and it also ensures that all future climate legislation addresses inequities. The Climate Solutions Now Act requires the Maryland Department of Environment to define environmental justice communities and to develop a plan to address the harms of those most impacted by climate change. It would also create the Justice Corps Program to promote climate justice with Green House Gas reduction projects in disproportionately affected communities.

The voters of Maryland entrusted you with the power to make a positive difference, especially for those suffering the most. We hope you are bold enough to "step into that power" and give a favorable report on Climate Solutions Now, because *climate justice, is racial justice*. Thank you.

Respectfully submitted,

Staci Hartwell, Chair
NAACP Maryland State Conference
Environmental and Climate Justice Committee
617 257 8893 t/v

[1]https://coast.noaa.gov/states/maryland.html

MMHA - 2022 - SB 528 - Climate Solutions Now (002)
Uploaded by: Aaron Greenfield
Position: FWA

MARYLAND MULTI-HOUSING ASSOCIATION, INC.

Bill Title: **Senate Bill 528, Climate Solutions Now Act of 2022**

Committee: **Education, Health and the Environment**

Date: **February 15, 2022**

Position: **Favorable with Amendments**

This testimony is offered on behalf of the Maryland Multi-Housing Association (MMHA). MMHA is a professional trade association established in 1996, whose members consist of owners and managers of more than 210,000 rental housing homes in over 958 apartment communities. Our members house over 538,000 residents of the State of Maryland. MMHA also represents over 250 associate member companies who supply goods and services to the multi-housing industry.

For purposes of the residential rental industry, Senate Bill 528 sets forth requirements that covered buildings, not owned by the state must reach a 20% reduction in net greenhouse gas emissions on or before January 1, 2030, a 40% reduction in net greenhouse gas emissions on or before January 1, 2035 and net–zero emissions on or before January 1, 2040. The Maryland Department of the Environment (MDE) must require the owners of covered buildings to measure and report direct emissions to the Department annually beginning in 2025. The Department shall adopt regulations and provide maximum flexibility to the owners of covered buildings to comply with building emissions standards, include an alternative compliance pathway allowing the owner of a covered building to pay a fee for building emissions that exceed the building emissions standards. And to the extent available, MDE must make available financial incentives recommended by the building energy transition implementation task force.

Additionally, this bill establishes a Building Energy Transition Implementation Task Force to study and make recommendations regarding the development of complementary programs, policies, and incentives aimed at reducing greenhouse gas emissions from the building sector and develop a plan for funding the retrofit of covered buildings to comply with building emissions standards. The plan developed must include recommendations related to the creation of commercial tax credits or direct subsidy payments for building decarbonization projects, the creation of financial incentives through empower and other state programs to support all aspects of the transition to electrified buildings. One representative to the Task Force is a facilities or property manager for an apartment building.

MMHA recognizes the significant impact of climate change. As outlined below, we are concerned about the cost implications associated with this bill and the need to engage local inspection offices and utilities.

1. Transitioning to Electric Appliances: Achieving net-zero energy emissions for the housing industry is essentially converting to 100% electric (eliminating carbon emissions). In the next ten 10 to 15 years, a significant percentage of the existing fuel

burning appliances in housing units will require replacement. While the new cost of an electric appliance versus gas is negligible, and in some cases even less expensive, upgrade of the electrical infrastructure is the significant financial barrier.

2. Electrical Infrastructure: Upgrading the electrical infrastructure in a multi-family dwelling is a costly proposition. As a result of labor, material and wiring, extra equipment (panel boxes), the logistics of exterior HVAC equipment (placing heat pump condensers and the copper line sets associated with them), such a modernization comes at a heavy price in the apartment setting. Additionally, the majority of apartment buildings receive electrical service underground, which significantly adds cost to a service upgrade. These are costs that housing providers will have no choice but to pass through to our residents.

3. Payback of Improvements: One workforce housing provider from the Baltimore region assessed that the infrastructure retrofits would result in roughly an $8500 per unit cost in a large scale or bulk retrofit scenario under normal global economic conditions. These improvements would likely yield minor energy savings due to the high efficiency heat pumps and water heaters, but since the tenant pays the energy bill, the tenant, not the housing provider, would collect any savings. The rental increase to fund these improvements would amount to $150-$200 per unit per month, which considers interest on a 15-year mortgage, vacancy and delinquency rates, depreciation, and property management costs.

4. Offsite Mitigation Credits: Some housing properties have the benefit of a less cost prohibitive approach, where a property owner could plant trees or install solar to comply with the totality of the required standards. Another provider of workforce housing in the Baltimore area has invested in extensive tree planting, energy saving lighting on private roadways, parking lots, and buildings, roof solar energy systems that power common area building lighting, laundry room appliances, and building common hot water heaters from oil to solar. These energy saving initiatives should be considered when calculating compliance under this legislation. This particular solar installation alone is equivalent to planting 114.9 acres of trees or elimination of 13,381,351 lbs. of greenhouse gas or taking 25 fossil fuel cars off the road for 71 years. These improvements – perhaps indirectly benefitting the building - certainly reduce greenhouse gas emissions and demand. Current law allows for the use of offset credits generated by alternative compliance mechanisms executed within the State, including carbon sequestration projects, to achieve compliance with greenhouse gas emissions reductions required by this subtitle. See Section 2-1206(4) of the Environment Article. MMHA urges that the bill provide offsite mitigation credits and consideration for greenhouse emission reduction initiatives that impact an entire community.

5. Subsidies: To avoid having these significant costs passed onto the tenant, the State must offer meaningful subsidies to meet net-zero retrofits.

6. Engagement with Local Inspection Offices and Utilities: The State must engage local inspection offices and utilities to streamline processes for upgrading electrical services to buildings and increase their labor force to accommodate the demand, which will significantly increase over next few years with higher electrical loads in housing and needs for electrical vehicle charging.

For these reasons, we respectfully request a favorable report with amendments on Senate Bill 528.

Aaron J. Greenfield, MMHA Director of Government Affairs, 410.446.1992

Testimony SB 528-Favorable with Amendments UULM-MD
Uploaded by: Ashley Egan
Position: FWA

Testimony in Support
SB 528 - Climate Solutions Now Act of 2022

To: Chairman Pinsky and the members of the Education, Health and Environmental Affairs Committee

From: Phil Webster, PhD
Lead Advocate, Climate Change
Unitarian Universalist Legislative Ministry of Maryland.

Date: February 15, 2022

The Unitarian Universalist Legislative Ministry of Maryland (UULM-MD) strongly supports **SB 528 Climate Solutions Now Act of 2022** and urges a FAVORABLE WITH AMENDMENTS report by the committee.

The UULM-MD is a faith-based advocacy organization based on the Principles of Unitarian Universalism. Two Principles are particularly relevant. The Second Principle, Justice, equity and compassion in human relations and the Seventh Principle, Respect for the interdependent web of all existence of which we are a part.

This legislation has notable provisions of justice and equity. We know that global climate change impacts marginalized communities first and worst. How can there be justice and equity if one part of society is reaping in the benefits, while another is paying all of the costs? The CSN Act creates the *Environmental Justice & Sustainable Communities Commission* to ensure that under invested communities are not left behind. The Act creates a *Just Transition Employment & Retraining Working Group* to ensure workers will receive fair and equitable labor standards and family-sustaining jobs. The Act also creates the *Maryland Climate Justice Corps* focusing on preparing youth for careers in green energy.

We also believe that we should all have respect for the interdependent web of all existence of which we are a part. We all know that the growing use of fossil fuels increases greenhouse gasses (GHG) leading to increasing global temperatures, increased frequency and intensity of severe weather and sea level rise. We applaud the accelerated targets for GHG reductions. The Act includes admirable provisions in energy generation and efficiency, reducing GHG reductions in the transportation and buildings sector, and starting to address methane leakage in landfills.

The Climate Solutions Now Act of 2022 should be strengthened with the amendments proposed by the Climate Partners, a coalition of justice and climate organizations. The Unitarian Universalist Legislative Ministry of Maryland supports these Amendments. They are attached to the end of this testimony.

All Marylanders need bold and urgent action! Please keep us on the right and moral path towards a livable climate and a sustainable world. We owe it to our children.

We support this bill and recommend a FAVORABLE WITH AMENDMENTS report in committee.

Phil Webster, PhD
Lead Advocate, Climate Change UULM-MD

Proposed Amendments to SB 528 Climate Solutions Now, 2022

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include “Facilitate the electrification of the building sector”.
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike “water and space heating” and substitute “on-site energy” and add on line 3, “except for kitchen appliances”.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

F. "Major Renovation" means a renovation project:

- For which the total projected cost exceeds 50% of the assessed value of the existing building; or
- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25–year period for all buildings funded at least 25% by the State.
- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
  - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
  - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language from HB 1033 that requires 40% of investments go to overburdened communities.
  - The language from HB 880 should be incorporated on page 22, lines 12-15 as well
  - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6

(12-501(3)(I)(2)(A (under the provision requiring solar ready):

A. The Installation of Solar Energy Systems

- To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
- Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
- Will be 20 stories or less in height, above grade plane.

B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
    - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
    - shadow studies indicate that 25% of a building's roof area will be in shadow.
    - Clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.

- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

OR

- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB 528 the **Buy Clean Maryland Act** provisions from HB 806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

Letter in support of SB0528.pdf
Uploaded by: Benjamin Roush
Position: FWA

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February 15, 2022

Chairman Paul Pinsky
Chair, House Environment and Transportation Committee

2 West Miller Senate Office Building
11 Bladen Street
Annapolis, MD 21401

Subject: **SB0528 Testimony and Support for FSi Engineers**

Dear Chairman Pinsky and the members of the Committee,

Thank you for the opportunity to provide you with my testimony in support of the Senate Bill 0528 for the Climate Solutions Now Act of 2022.

I am a past Chair of the Board for the Maryland Chapter of the US Green Building Council, Chair of the AIA Baltimore Committee on the Environment, and I have long attended the Maryland Green Building Council meetings that are open to the public. I am a Principal at FSi, with 37 employees—we are mechanical engineers with a strong focus in green and net zero building.

Senate Bill 0528 endures that Maryland is not left behind in the green building economy and addresses a wide host of issues that we must address to keep Maryland at the forefront of addressing climate change. The bill sets a slow pathway to carbon neutrality. Many of the provisions match or align with the Paris Agreement goals, and put us in line with other neighboring states for what our public construction will require. Most importantly, the bill looks to address environmental justice concerns, creating a working group to specifically address and correct the unequal burden of climate change.

I encourage you to adopt the amendments put forth by the Maryland Climate Partners, which significantly strengthen this bill.

I look forward to seeing your support an ultimately the passage of this bill.

FSi Engineers

Ben Roush, PE, FPE, LEED AP BD+C, ASHRAE BEMP and BEAP, Certified Commissioning Professional

Principal

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SB528_FWA_Phillips.pdf
Uploaded by: Brad Phillips
Position: FWA

SENATE EDUCATION, HEALTH & ENVIRONMENTAL AFFAIRS COMMITTEE

TESTIMONY

Submitted by Dr. Brad Phillips, Executive Director
February 15, 2022

SB 528 – Climate Solutions Now Act of 2022

POSITION: Support with Amendments

The Maryland Association of Community Colleges (MACC), which represents Maryland's sixteen (16) community colleges, supports Senate Bill 528. The goal of net-zero greenhouse gas emissions will require substantial and sustained commitment. New and renovated physical infrastructure must be accompanied by a skilled workforce capable of maintaining this infrastructure.

Maryland's community colleges are constantly reviewing opportunities for expanding postsecondary education to include emerging technologies and training. As our colleges conduct impact studies and environmental scans around industry and workforce needs, the skills necessary to achieve these types of efficiencies in our State are lacking.

Achieving net-zero greenhouse gas emissions will require investing in workforce that can address the skills needed to meet the demands of the evolving industries. As the largest providers of workforce training, community colleges would like to take this moment to point out that major policy shifts in our energy grid and restructuring a large section of our economy will require massive investments in employee training. There are few training programs on repairing zero-emissions technologies and the industry is already struggling with ways to repair electric vehicles.. The same scenario is true around battery technology, carbon capture, and modern building performance technology. Community colleges are concerned that without adequate investment in Maryland's workforce skills, the costs for effectuating the goals of The Climate Solutions Now Act will increase dramatically.

Our institutions are also concerned about the costs and potential delays to our facilities if the infrastructure does not keep pace with the requirements that will now be in law. Investment in physical infrastructure must be accompanied by an enhanced electrical grid. Each investment in buildings and infrastructure must be accompanied by investment in our state's workforce capabilities. Maryland's community colleges are committed to developing the human capital required to implement and sustain the goals of this legislation.

Without investing in our workforce and our energy infrastructure, we are concerned that the mandates in this legislation will stall our state's full economic potential. As you consider this legislation, we are supportive of the goals and request you consider these two aspects of the legislation so community colleges can be prepared to meet the changes in the workforce.

SB528_IndivisibleHoCoMD_FWA_BrianWessner.pdf
Uploaded by: Brian Wessner
Position: FWA

SB0528 – Climate Solutions Now Act of 2022

Testimony before

Education, Health, and Environmental Affairs Committee

February 15, 2022

Position: Favorable With Amendments

Mr. Chair, Mr. Vice Chair and members of the committee, my name is Brian Wessner, and I represent the 750+ members of Indivisible Howard County. We are providing written testimony today in ***support of SB0528***, to define coordinated efforts to create long lasting climate solutions for today's generation and generations yet to come. Indivisible Howard County is an active member of the Maryland Legislative Coalition (with 30,000+ members). We appreciate the leadership of Chairman Pinsky in moving this bill, our highest priority bill of the 2022 session.

Solving the climate issues facing Maryland is not a one-size-fits-all effort. Success requires setting aggressive goals for the reduction in greenhouse gases (GHG), identifying the sources of those gases in Maryland and who are the most affected, and providing the organizational and financial resources to address those sources in order to meet or exceed Maryland's goals. With amendments outlined in this testimony, including the priority amendments being put forth by Maryland Climate Partners and the Climate Justice Wing (see attached), SB0528 targets these elements of a lasting solution through:

- Responding to the **urgency of climate change** by reducing GHG emissions 60% by 2030 (based on 2006) and continuing that momentum by reaching net zero status in 2045.

- Focusing on **Environmental Justice and Climate Equity** by establishing funding through the Climate Catalytic Capital Fund, energizing our young people through a new Climate Justice Corps, mandating research to determine and focus on those most affected by climate change, and providing a just transition to those whose jobs are affected by the transition from fossil fuels to renewable energy. Proposed amendments, supporting attached amendments put forth by the Maryland Climate Partners and the Climate Justice Wing, include:

  - 40% of the Fund to be explicitly spent on overburdened communities including whole-structure retrofits; the Fund is established to facilitate the electrification of the building sector and the installation of non-fossil fuel equipment

  - The Climate Justice Corps guarantees good pay, wages, and benefits – as specified in SB0228 - focusing on providing opportunities for overburdened communities, including those experiencing the greatest impact to employment

- Setting **meaningful targets to reduce net-GHG emissions in existing state and private buildings** with the goal of achieving net-zero emissions. State buildings will reduce GHG by

50% in 2030 and becomenet-zero by 2035. Private buildings have interim reduction goals of 20% by 2030 and 40% by 2035, with net-zero GHG by 2040, Proposed amendments, supporting attached amendments put forth by the Maryland Climate Partners and the Climate Justice Wing, include:

- Adopted regulations to prioritize direct emissions reductions from qualified buildings via electrification plans and pathways

- Adopted regulations to provide protections against financial cost pass-through and evictions for tenants in covered multi-family buildings

- Adopted regulations require covered public buildings' retrofits to be completed with a high quality workforce (i.e., prevailing wage, insurance coverage, paid leave, etc.)

- Establishing **energy efficiency standards for all new buildings, both state and private,** to meet all water and space heating demands without the use of fossil fuels beginning in 2023, meet electric-ready standards to support solar energy systems, EV charging, and interaction between the building and the grid. Proposed amendments, supporting attached amendments put forth by the Maryland Climate Partners and the Climate Justice Wing, include:

  - When the State provides funding of 25% or more, reduce modeled energy use by 40% for permit applications received between January 1, 2023 and December 31, 2025, and by 60% for permit applications received between January 1, 2025 and December 31, 2027

  - For all other new buildings, reduce modeled energy use by 40% for permit applications received between January 1, 2025 and December 31, 2027

- Protecting our students by establishing a **Net Zero School Pilot Program,** for new school construction. Each local school system planning to construct a new school between 2023 and 2033, is required to build at least one of those schools to meet net zero energy requirements. These projects will be supported by a **Net Zero School Grant Fund** to assist local school systems. Proposed amendments, supporting attached amendments put forth by the Maryland Climate Partners and the Climate Justice Wing, include:

  - The Interagency Commission on School Construction (IAC) funding process covers planning, design, and engineering for net zero schools.

  - The Maryland Green Building Council is required to provide an annual status on meeting the high performance building requirements

- **Energy efficiency savings** will be achieved using two strategies: (1) Electric companies are required to implement **energy efficiency programs** for their customers, with improvements based on a percentage of the electric company's 2016 gross retail sales. These savings goals are 2.25% in 2024 and 2025, 2.5% in 2026, and 2.75% in 2027 and thereafter. (2) A **Climate Transition and Clean Energy Hub** will be established to provide technical assistance to public and private entities to achieve GHG reductions and comply with state and local energy efficiency and electrification requirements. Proposed amendment includes:

  - For the Climate Transition and Clean Energy Hub, include requirements for a user-friendly website and dashboard for keeping track of the hub's progress and findings, facilitating the collaboration and leveraging of project experiences

- Vehicles of all types are significant contributors to current levels of GHG. To reduce their impact, a number of **Transportation** actions are included to initiate the transition zero emissions vehicles for school buses, as well as passenger cars and light-duty vehicles in the state fleet. These actions also include the development of a charging infrastructure to support these zero emissions fleets. Proposed amendment, supporting attached amendments put forth by the Maryland Climate Partners and the Climate Justice Wing, includes:

  - On page 42, in line 14, delete “subject to the availability of funding.” The state transition to zero emissions vehicles should be mandatory, sustained effort - not subject to fits and starts based on variable funding levels.

- To encourage adoption of solar technology in low income areas, community solar projects on rooftops, parking lots or brownfields in these areas are eligible to receive **solar tax incentives** that will exempt these projects from personal property tax as noted in SB0264 currently under consideration.

These actions, when taken together, create a strong framework for achieving Maryland’s GHG reduction goals.

Thank you for your consideration of this important legislation.

We respectfully urge a favorable report with amendments.

Brian Wessner
Columbia, MD 21044

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
  - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
  - The purpose of the funds should explicitly include “Facilitate the electrification of the building sector”.
  - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
  - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike “water and space heating” and substitute “on-site energy” and add on line 3, “except for kitchen appliances”.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:

  D. For new covered buildings funded at least 25% by State funds
  - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
  - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
  - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
  - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

  F. “Major Renovation” means a renovation project:
  - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
  - Involving a change of use, if the change involves the application of different requirements of the standards.

  G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:
  - A 40% reduction in the building’s average annual energy use; or
  - A 20% reduction in modeled energy use consumption over the current Energy Code.

  H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
  - A 25–year period for all buildings funded at least 25% by the State.
  - A 15–year period for all other buildings.
- Provisions regarding “alternative compliance pathway” on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 (“PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS”)
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should

- require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
- provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
  - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
  - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):
  A. The Installation of Solar Energy Systems
     - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
     - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
     - Will be 20 stories or less in height, above grade plane.

  B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
     - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
     - shadow studies indicate that 25% of a building's roof area will be in shadow.
     - Clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

OR

- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

ACEEE comment letter of MD SB 528.pdf
Uploaded by: Bryan Howard
Position: FWA

American Council for an Energy-Efficient Economy
529 14th Street, N. W., Suite 600 Washington, D.C. 20045 202.507.4000 202.429.2248 www.aceee.org

February 15, 2022

Testimony of Bryan Howard
Director, State Policy, American Council for an Energy-Efficient Economy
Before the Senate Education, Health, and Environmental Affairs Committee
RE: Support of Senate Bill 0528, the Climate Solutions Now Act

Honorable Members of the Committee:

On behalf of the American Council for an Energy-Efficient Economy (ACEEE), I write in support of Senate Bill 0528 (SB 528), the Climate Solutions Now Act. ACEEE is a nonprofit research organization based in Washington, D.C. that conducts research and analysis on energy efficiency policy and programs. We have been active on energy efficiency issues at the national, state, and local level for more than forty years, collecting extensive best-practice information on topics including energy efficiency programs. ACEEE has a long history of work in the state including recent participation in the Maryland Climate Change Commission (MCCC) Buildings Sub-Group (BSG) and Maryland Public Service Commission, Future Program Working Group (FPWG) related to the EmPOWER program.

SB 528 is vital legislation to achieve net-zero statewide greenhouse gas emissions in Maryland by 2045. There are important provisions of the legislation which are critical for economic development, energy affordability, and job creation in Maryland. We support the legislation but do recommend improvements to the bill that would help ensure that the proposed policies are done in a cost-effective manner while ensuring that policies are implemented equitably.

While there are many critical elements of the legislation, we focus our testimony on the on some of the provisions related to buildings and the energy efficiency and conservation goals for designated utilities.

Building Performance Standards:

Residential and commercial buildings in Maryland account for nearly 60 percent of energy consumption in the state.[1] Unfortunately, the energy being used to heat and cool these buildings is often wasted in inefficient equipment or in buildings that are poorly insulated and drafty. This passes unneeded costs onto consumers, many of whom are those who can least afford high utility bills.

In 2020 ACEEE released an updated analysis on household energy burdens (i.e. those that pay more than 6% of income on energy bills) and found that high energy burdens remain a persistent national challenge. This research specifically examined energy burdens in Baltimore, and the results are troubling. We found that in the Baltimore metro area (pre-pandemic), the median energy burden of low-income households was four times higher than non-low-income households, and Black households paid 34% more of their income on energy bills than non-Hispanic white households. In addition, at

[1] U.S. Energy Information Administration Maryland State Profile and Energy Estimates. https://www.eia.gov/state/?sid=MD#tabs-2

least one-quarter of low-income households had energy burdens above 18%, which nine times higher than the average U.S. household.[2]

Provisions of the bill to improve renovation standards for large buildings (including multifamily buildings) could help alleviate energy burdens in Maryland communities, support the state's emission reduction targets and provide additional benefits. Such standards have been adopted in Washington State, Colorado and by municipalities including the District of Columbia, New York City, St. Louis, Boston and Denver. These actions are buoyed by the recent launch of National Building Performance Standards Coalition, which is comprised of 33 state and local governments (including Montgomery, Prince Georges County and Annapolis) which have committed design and implement building performance policies and programs in their jurisdictions.[3]

Large savings are generally possible in existing buildings as shown by a federal deep retrofit program that reduced energy use an average of 38% as part of building renovations.[4] Often energy efficiency upgrades can make buildings more comfortable and healthier by improving indoor air quality and making buildings more comfortable. Our current public health crisis should serve as an important reminder of the need to improve the health and safety of buildings across the state.

While the bill provisions are important in reducing the consumption of inefficient buildings in Maryland there are some opportunities to improve it. Based on our research and experience with other programs ACEEE recommends incorporation of language to ensure these standards do not negatively impact residents of affordable housing. To that end we support amendment language included in the testimony of the National Housing Trust regarding tenant consultation and focused consideration of affordable housing in the implementation of the standard.

In addition, ACEEE recommends that the bill allow utilities to count savings from energy efficiency or other emissions reduction programs that help covered buildings comply. This should be focused on properties from economically distressed areas of the state or other factors that could make compliance challenging.

Building Codes:

The burning of fossil fuels in buildings accounts for 13% of total U.S. emissions.[5] Reducing these numbers through efficiency and electrification is a critical step toward reaching total decarbonization. The legislation would broadly update state building codes to electrify building operations (e.g. space

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[2] More information on Baltimore area energy burdens is available on the ACEEE website: https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_baltimore.pdf

[3] About the National BPS Coalition https://nationalbpscoalition.org/

[4] Energy Savings from GSA's National Deep Energy Retrofit Program. Oak Ridge, Tennessee: Oak Ridge National Laboratory. https://www.gsa.gov/cdnstatic/NDEREnergySavingsReport5.pdf.

[5] Sources of Greenhouse Gas Emissions. U.S. Environmental Protection Agency, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#commercial-and-residential

and water heating), and imbed electric vehicle (EV) charging infrastructure. These provisions are consistent with recommendations from ACEEE research.[6]

ACEEE research also finds programs to promote the electrification of space heating, water heating, and other end uses of fossil fuels in buildings are expanding across the country. A recent update and expansion of a 2020 ACEEE report found 42 building electrification programs across state, local and utility levels.[7] The inclusion of EV charging infrastructure in building codes is becoming more common. Several states and localities in the region including Vermont, Massachusetts and the District of Columbia have implemented building code requirements for EV charging infrastructure. [8]

While electrifying buildings can have benefits ACEEE strongly encourages the inclusion of energy efficiency targets in these electric code provisions. While Maryland generally has a strong track record of energy efficiency in its code adoption process, the legislation should embed efficiency in these future codes, such as requiring at least 40% energy use reductions as of 2025.

Including efficiency in the process can have multiple advantages. Energy efficiency can reduce certain construction costs and total cost to homeowners and businesses which can ease the transition to all electric construction. Efficient new homes and commercial buildings are also more comfortable during temperature spikes such as extreme heat and cold while also reducing reliability concerns associated with broader electrification. This will also ensure that energy savings are locked in at the point of construction, which avoids unnecessary energy costs to consumers over the lifetime use of a building. It can also avoid the logistical challenges and higher costs that arise during a renovation process.

Utility Energy Efficiency and Conservation Goals:

ACEEE closely tracks efficiency policies including energy efficiency targets for utilities, often called energy efficiency resource standards (EERS). These targets are critical to encouraging savings over the near and long term, and our research[9] and research from the Brattle Group finds they are the number one policy driver of energy efficiency savings[10]. While Maryland has a quality EERS of 2 percent gross energy savings (or 1.6 percent net) the existing EERS falls below several states in the Northeast and others throughout the country.

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[6] Cohn, C., and N. W. Esram. 2022. Building Electrification: Programs and Best Practices. Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/researchreport/b2201.

[7] IBID

[8] Howard, B., S. Vaidyanathan, C. Cohn, N. Henner, and B. Jennings. 2021. The State Transportation Electrification Scorecard. Washington, DC: ACEEE. https://www.aceee.org/sites/default/files/pdfs/t2101.pdf

[9] Policies Matter: Creating a Foundation for an Energy-Efficient Utility of the Future. Washington, DC: ACEEE. https://www.aceee.org/sites/default/files/policies-matter.pdf.

[10] Energy Efficiency Administrator Models: Relative Strengths and Impact on Energy Efficiency Program Success. Boston, MA: The Brattle Group. https://www.brattle.com/news-and-knowledge/news/report-by-brattle-economists-evaluates-effectiveness-of-energy-efficiency-administrator-models.

The proposed legislation would ramp up the savings goals to 2.25 percent and incrementally reach 2.75 percent gross energy -savings in 2027. The average of the proposed EERS goals from 2024 to 2027 is 2.57 percent gross savings (or 2.05 percent net) would place Maryland as a national leader, but still behind Massachusetts.

The table below is data taken from the ACEEE 2021 State Progress Report of states with an EERS and the five-year average electric target based on net savings.[11] It includes Maryland's current and projected EERS target for comparison. For purposes of comparison, for states reporting savings on a gross basis goals have been converted to net using a net-to-gross factor of 0.84.

State	% of electricity sales covered by EERS policy	Approximate average annual electric savings target for 2020–2025
Massachusetts*	85%	2.7%
Maryland Under SB 528	97%	2.05%
New York	100%	2.0%
Rhode Island	99%	2.0%
Illinois	89%	2.0%
Vermont	98%	1.7%
Colorado	56%	1.7%
New Jersey	100%	1.6%
Maryland Under Current Law	97%	1.6%
California	73%	1.5%
Minnesota	100%	1.4%
Hawaii	100%	1.4%
Virginia	87%	1.2%
Oregon	61%	1.2%
Arkansas	50%	1.2%
Connecticut	93%	1.1%
Nevada	88%	1.1%
Maine	100%	1.0%

[11] Berg, W., E. Cooper, and M. DiMascio. 2022. State Energy Efficiency Scorecard: 2021 Progress Report. Washington, DC: ACEEE. aceee.org/research-report/u2201.

Michigan	100%	1.0%
New Mexico	69%	1.0%
Iowa	75%	0.9%
District of Columbia	100%	0.8%
Wisconsin	100%	0.7%
Washington	83%	0.7%
Pennsylvania	96%	0.6%
Texas	74%	0.2%
North Carolina	100%	Combined EERS/RPS

***Massachusetts goals show Mass Save electric savings targets for 2019-21 as reported in ACEEE's State Energy Efficiency Scorecard: 2021 Progress Report (2022). New plans for 2022-24 programs approved by the Massachusetts DPU in February 2022 have set new targets aligned with recent legislative goals to reduce statewide GHG emissions 50% below 1990 levels by 2030, and achieve net zero statewide GHG emissions by 2050. The realignment includes a far greater investment in electrification to leverage the growing carbon benefits of parallel improvements to the state's Renewable Portfolio Standard under Next Generation Climate Roadmap legislation. ACEEE is working to update our EERS tracking in a way that accurately reflects the relative carbon benefits of these new goals, either on an MMBtu or avoided GHG basis.**

It's also important to note that Maryland is well positioned to meet the increased target. Based on reporting from 2019, the state is already documenting 2.6% gross savings which is well above the existing codified target and close to the proposed updated target for 2027.

Whether as a part of SB 528 or in complementary legislation, ACEEE recommends revisions to the EmPOWER program better support our climate goals and energy needs.

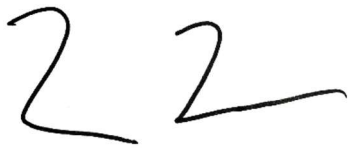
Reforms include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions,
- Update EmPOWER to allow for fuel switching, and
- Codifying benefits to low-income customers potentially through savings goals or spending targets.

There are ongoing deliberations within the FPWG to update the EmPOWER to better align with state climate policy and equity objectives along the lines of the above recommendations. While the Public Service Commission has yet to provide any recommendations to update the EmPOWER statue, the General Assembly should monitor progress closely as this valuable program will sunset in 2023 without legislative action.

We urge support of SB 528, which would put Maryland on an important path towards greater energy efficiency while reducing emissions.

Sincerely,



Bryan Howard
Director, State Policy
American Council for an Energy-Efficient Economy

SB528 - FWA - SWA .pdf
Uploaded by: Caitlin McDonough
Position: FWA

Southwest Airlines Co.
David Richardson
Senior Director, Governmental Affairs
(202) 263-6287 _ Office
david.richardson@wnco.com

February 15, 2022

The Honorable Paul Pinsky
Chair, Senate Education, Health and Environmental Affairs Committee
Miller Senate Office Building, 2 West
11 Bladen Street
Annapolis, MD 21401

SENATE BILL 528 – CLIMATE SOLUTIONS NOW ACT OF 2022 – Favorable w/ Amendment

Dear Chair Pinsky and Members of the Committee:

Southwest Airlines submits the following comments in support of amendments to Senate Bill 528, the Climate Solutions Now Act of 2022, and respectfully urges the favorable consideration of the amendment below. SB528 is a comprehensive approach to counteracting climate change in Maryland, including significant actions in the State's transportation sector. The development and implementation of sustainable aviation fuels is a vital part of those efforts and Southwest urges the Committee to consider allocating resources for the increased development and use of those tools as part of this comprehensive approach. While we have seen great strides in the electrification of automotive vehicles, that technology for aircraft is still decades away, but Maryland can act now to increase the use of sustainable aviation fuels and help combat the environmental impacts of air travel now.

Southwest respectfully submits the following amendment for the Committee's consideration:

On page 5, in line 20, after "**TRANSPORTATION SECTOR**" insert "**AND THE USE OF SUSTAINBLE ALTERNATIVE FUELS IN AVIATION**".

Thank you for your consideration of Southwest's views concerning this very important matter. If your, your staff or any of your colleagues have questions or need additional information please do not hesitate to contact me.

Sincerely,

David Richardson

SB0528_Climate_Solutions_MLC_FWA.pdf
Uploaded by: Cecilia Plante
Position: FWA

MARYLAND LEGISLATIVE COALITION

TESTIMONY FOR SB0528
CLIMATE SOLUTIONS NOW ACT

Bill Sponsor: Senator Pinksy
Committee: Education, Health, and Environmental Affairs
Organization Submitting: Maryland Legislative Coalition
Person Submitting: Cecilia Plante, co-chair
Position: FAVORABLE WITH AMENDMENTS

I am submitting this testimony in favor of SB0528 with amendments on behalf of the Maryland Legislative Coalition. I am speaking for the more than 30,000 citizen lobbyists in our Coalition.

We love this bill. It is a bold, comprehensive attack on the climate crisis and a recognition that we must have a multi-pronged approach if we are to ever get to net zero emissions. We are impressed with all the sectors of greenhouse gases that it targets - the reduction of emissions in transportation with the zero-energy buses and state fleets; the focus on building all electric buildings and reducing emissions in existing buildings; and the support of solar tax incentives that will help 'green' our grid. We love the aggressiveness of the new greenhouse gas reduction targets, and the change in methane accounting. However, we are especially impressed with the provisions that deal specifically with climate justice because we feel that you must lead with equity and take care of the people who will be most disadvantaged by the transition that we must make to have a cleaner future.

There is much to like in this bill. We love the idea that we should not be digging a deeper hole by continuing to support fossil fuel infrastructure in buildings. We agree that we should not be building a greater reliance on fossil fuels. The only weakness that we see in the legislation centers around the building of net zero schools. The bill calls for building only one net zero school in each district between 2023 and 2033.

With the Built to Learn Act funding available, we are about to make the biggest investment in schools that we have made in decades. Building, or upgrading schools, with fossil fuel technology is a poor investment, given that the Maryland Commission on Climate Change has estimated that gas prices will be 2 to 5 times higher than current levels within ten years. Additionally, over the next ten years, fossil fuel infrastructure will be harder to maintain and replace. Schools do not get a lot of money for renovation, so what we are building today will be what we see in 30 years. We can't afford that. Building anything but net zero, or net zero ready schools is an expensive waste of taxpayer dollars and a mistake in terms of reaching our greenhouse gas emissions targets.

We understand that funding is always a concern, and we think that the Net Zero School Grant fund that will be put in place to help schools meet the requirement to build at least one net zero school in each school district, is a great idea. But if we only build one net zero school in each district, we are still digging

a pretty big hole. Especially since the net zero schools that we have built recently were similar in cost, or less costly, than building schools with fossil fuel infrastructure. So, although the idea of building one net zero school is better than building none, but we are hoping that the legislature will see that making an investment in building *all* net zero schools, or net zero ready schools, is really the better financial option.

Maryland needs to do this. We have been held hostage by fossil fuel companies for way too long, and it is time that we made an effort to give our children a cleaner, greener future.

As members of the Climate Partners, we support this bill and recommend a **FAVORABLE WITH AMENDMENTS** report in committee. Suggested amendments are listed below.

Amendments coordinated by the Maryland Climate Partners

Priority Amendments

The goal is to update the definition of Schools and High-Performance Buildings and also make the net zero-ready requirements stronger.

1. This adds energy efficiency provisions for buildings.
2. Insert ALL of this language on Page 35, following line 9, numbered as follows:
   D. For new covered buildings funded at least 25% by State funds
   - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
   - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

   E. For all other new covered buildings
   - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
   - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

   F. "Major Renovation" means a renovation project:
   - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
   - Involving a change of use, if the change involves the application of different requirements of the standards.

   G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:
   - A 40% reduction in the building's average annual energy use; or
   - A 20% reduction in modeled energy use consumption over the current Energy Code.

   H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
   - A 25–year period for all buildings funded at least 25% by the State.
   - A 15–year period for all other buildings.
3. This applies solar ready requirements.
   Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
   School buildings that are not net-zero should be net-zero ready (potential amendment language below)

   Insert on Page 35, following line 6
   (12-501(3)(I)(2)(A (under the provision requiring solar ready):
   A. The Installation of Solar Energy Systems

- To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
- Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
- Will be 20 stories or less in height, above grade plane.

B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
   - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
   - shadow studies indicate that 25% of a building's roof area will be in shadow.

Also clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.

4. Regarding the NZ School Pilot

Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -

P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

OR

Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.

SB528 Climate Solutions Act Now of 2022.pdf
Uploaded by: Dawana Sterrette
Position: FWA

BALTIMORE CITY
PUBLIC SCHOOLS

Brandon M. Scott
Mayor, City of Baltimore

Johnette A. Richardson
Chair, Baltimore City Board
of School Commissioners

Dr. Sonja Brookins Santelises
Chief Executive Officer

Testimony of the
Baltimore City Board of School Commissioners
Support with Amendments
Senate Bill 528 – Climate Solutions Now Act

February 15, 2022

The Baltimore City Board of School Commissioners supports the building of net zero energy schools and applauds the sponsor for recognizing the need to reduce greenhouse gas emissions.

Baltimore City Public Schools currently has two net zero energy schools, Holabird Academy and Graceland/O'Donnel Heights. The sponsor recognizes the need for funding to build net zero energy schools. However, once the net zero schools are built, there are additional costs associated with operating and maintaining the schools. Ongoing monitoring by staff and technology ensure the net zero goals are met as well as the need fsor training of staff on new building systems. There will be a need for specialized tools such as diagnostic meters and programs for servicing new building systems. Any additional funding made available to help with these additional costs after construction would be beneficial.

The school board understands the sponsors zero-emission school buses that are not diesel-powered. However, we would suggest "incremental costs" definition found on page 22 of the bill also include the cost of installing and maintaining charging infrastructure. The Board would also suggests that boards of education be given additional time to implement a contract for the purchase or use of zero emission school buses to fiscal year 2027 because electric buses cost much more than diesel buses and there needs to be funding and time to establish a sufficient infrastructure such as meter upgrades, charging stations, etc.. It would cost approximately $200,000 per bus to upgrade from diesel to electric.

For the foregoing reasons, the Baltimore City Board of School Commissioners urges a favorable report with amendments.

Dawana Merritt Sterrette, Esq.
Director, Legislative and Government Affairs
dsterrette@bcps.k12.md.us
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2022-02-11-SB528- ANS - FAV.pdf
Uploaded by: Denisse Guitarra
Position: FWA

Audubon Naturalist Society
Connecting people with nature in the DC Region

February 14, 2022

Written Testimony for SB528 - Climate Solutions Now Act of 2022
Position: Favorable
Submitted by: Denisse Guitarra, Maryland Conservation Advocate, Audubon Naturalist Society (ANS)

Dear Senate Education, Health, and Environmental Affairs Committee,

For 125 years, Audubon Naturalist Society (ANS) has inspired people to enjoy, learn about and protect nature. We thank the Senate Education, Health, and Environmental Affairs Committee for the opportunity to provide testimony for SB528, Climate Solutions Now Act (CSNA) of 2022.

As we navigate today's public health, social, and economic crises, it is critical to support the passage of SB414 as it is a sustainable well-rounded legislative solution. This legislation will ensure that Maryland meets its greenhouse gas reduction goals by cutting back emissions to 60% by 2030 and ensures that we are on a path to becoming carbon neutral by 2045. It includes policies to reduce carbon emissions from two of the largest sectors of carbon emissions: buildings and transportation. Since buildings emit 40% of Maryland's emissions, we support CSNA's provisions reduce emissions from buildings by support the electrification of them. In terms of emissions from the transportation sector, we support CSNA's provisions of setting a goal for the state to transition into an all-electric car fleet by 2027.

ANS supports CSNA of 2022 because it has provisions that centers and prioritizes climate change opportunities for communities of color. Through the creation of a Climate Catalytic Capital Fund and a Climate Justice Corps, the Climate Solutions Now Act of 2022 aims to support projects to reduce GHG emissions in overburdened communities and invest in a "green-collar" workforce. Additionally, we strongly support the provisions that direct the Maryland Department of the Environment to conduct research and data gathering on cumulative impacts and overburdened communities, in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities.

ANS supports SB528 as this legislation because we have no time to delay on meaningful climate action. People and the environment are already experiencing the effects of climate change from heat waves, flooding, and storm surges. On behalf of ANS and our 28,000 members and supporters, we recommend that the Senate Education, Health, and Environmental Affairs Committee supports the passage of SB528.

Sincerely,

Denisse Guitarra
MD Conservation Advocate
Audubon Naturalist Society

Montgomery County Performance Ordinance - Building

Uploaded by: Diana Younts

Position: FWA

Steven Winter Associates, Inc.

Prepared For:
Montgomery County, MD
Department of Environmental Protection

Prepared By:
Steven Winter Associates

Date:
February 2022

Building Energy Performance Standards Development – Technical Analysis

Montgomery County, MD

Table of Contents

EXECUTIVE SUMMARY

BACKGROUND AND SUMMARY OF PROPOSED BEPS LEGISLATION

Montgomery County, MD (County) released its final Climate Action Plan (CAP) in June 2021 with a goal to cut community-wide greenhouse gas emissions (GHG) by 80% by 2027 and 100% by 2035. According to the CAP, "the County will need to deploy a combination of energy performance standards, code requirements, and incentives to support 100% building electrification by 2035."[1]

The County has introduced legislation[2] that would set site energy use intensity (site EUI) building energy performance standards (BEPS) for large commercial and multifamily buildings. The site EUI metric was recommended by Montgomery County stakeholders[3] and is a building energy performance metric that rewards energy efficiency and the electrification of fossil fuel systems. The legislation would segment covered buildings into groups according to their building type and size, phasing in compliance with the performance standards. Each group would be subject to a final performance standard between 2035 and 2037, depending on the group. Each building within a group would be required to meet its final performance standard as well as interim standards in earlier years in 4-year intervals.

GOALS OF THIS REPORT

This report is meant to provide policy makers with technical information relevant to the setting of building energy performance standards. The following goals were identified by the County to consider during the study:

- Create a framework to generate potential energy performance standards for covered buildings.
- Understand how the timing and stringency of potential energy performance standards impact cumulative GHG emissions over the next two decades.
- Evaluate what retrofits are technically feasible, what the total cost might be (independent of who pays), and the cost and carbon benefits of achieving the energy performance standards.
- Assess how a BEPS intervention affects the performance of the covered buildings towards a zero-emissions buildings goal by 2035.

Steven Winter Associates, in close coordination with the Montgomery County Department of Environmental Protection (the "study team") completed this study which provides the following information:

- A review of the building stock and energy benchmarking information of Montgomery County and development of an approximate list of buildings projected to be subject to a BEPS policy. This building stock was separated into building types to set technically feasible site EUI targets.
- A recommended method for setting building performance standards, what the targets can be, and the estimated impacts of meeting those targets.
- Case studies detailing how different energy performance standards can be achieved for a representative sample of buildings.
- An estimate of the total capital investment to reach the standards, which would inform both the cost to building owners and the level of economic impact of the recommended standards.

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[1] Montgomery County. "Montgomery County Climate Action Plan Public Draft". https://www.montgomerycountymd.gov/green/Resources/Files/climate/draft-climate-action-plan-printable.pdf Page xvii.
[2] Bill 16-21 - Environmental Sustainability - Building Energy Use Benchmarking and Performance Standards - Amendments: https://apps.montgomerycountymd.gov/CCLLIMS/BillDetailsPage?RecordId=2707
[3] Montgomery County. "BEPS Stakeholder Recommendation Report". https://www.montgomerycountymd.gov/DEP/Resources/Files/ReportsandPublications/Energy/MC-BEPS-Stakeholder-Report.pdf page 10.

RESULTS

Target Setting Method

Site EUI building performance standards were developed based on technically achievable performance using typical energy use profiles in various building types representative of Montgomery County's building stock and assuming retrofits using commercially available technology. This approach is described in depth in the section *Site Energy Use Intensity Performance Targets*.

The countywide impact analysis evaluated three potential targets. These targets were developed by applying the following methodology to each building type. The result is that all buildings in the same occupancy type grouping have the same EUI targets (e.g., all office buildings have the same site EUI targets, all multifamily buildings have the same site EUI targets, all hospitals have the same site EUI targets).

- **Energy Efficiency (EE) Target**: Sets a target such that all energy end uses were deeply optimized and tuned without impacting occupant use patterns. This target-setting method assumed that typical buildings could maintain the use of fossil-fuel burning systems for typical end uses such as space and water heating but would minimize inefficiencies of those systems.
- **Zero Net Carbon-Compatible (ZNC) Target**: Sets the target to a level simulating the electrification of fossil-fuel end uses using market-ready technology in an energy efficient building. Electrification is one of the deepest forms of energy efficiency since electric equipment operates at a much higher efficiency than fuel-fired equipment This target was intended to be most compatible with Zero Net Carbon goals because it implicitly required the elimination of most on-site fuel burning.
- **Mid-point between EE and ZNC Targets**: This target type exemplifies how the site EUI targets can be chosen anywhere along this spectrum between the EE and ZNC targets. A mid-point target was calculated to identify the impact of splitting the difference between the two targets. This target could be achieved using a combination of energy efficiency measures and partial electrification, or electrification of some, but not all, fossil-fuel-driven systems.

In framing this report, a site EUI target higher than the EE target was deemed unsuitable as it would not drive enough countywide savings. At the other end of the spectrum, a site EUI target lower than the ZNC target may not be technically achievable for most buildings.

Potential site EUI target options and the 2019 median site EUI for each occupancy type are shown in Figure 1.

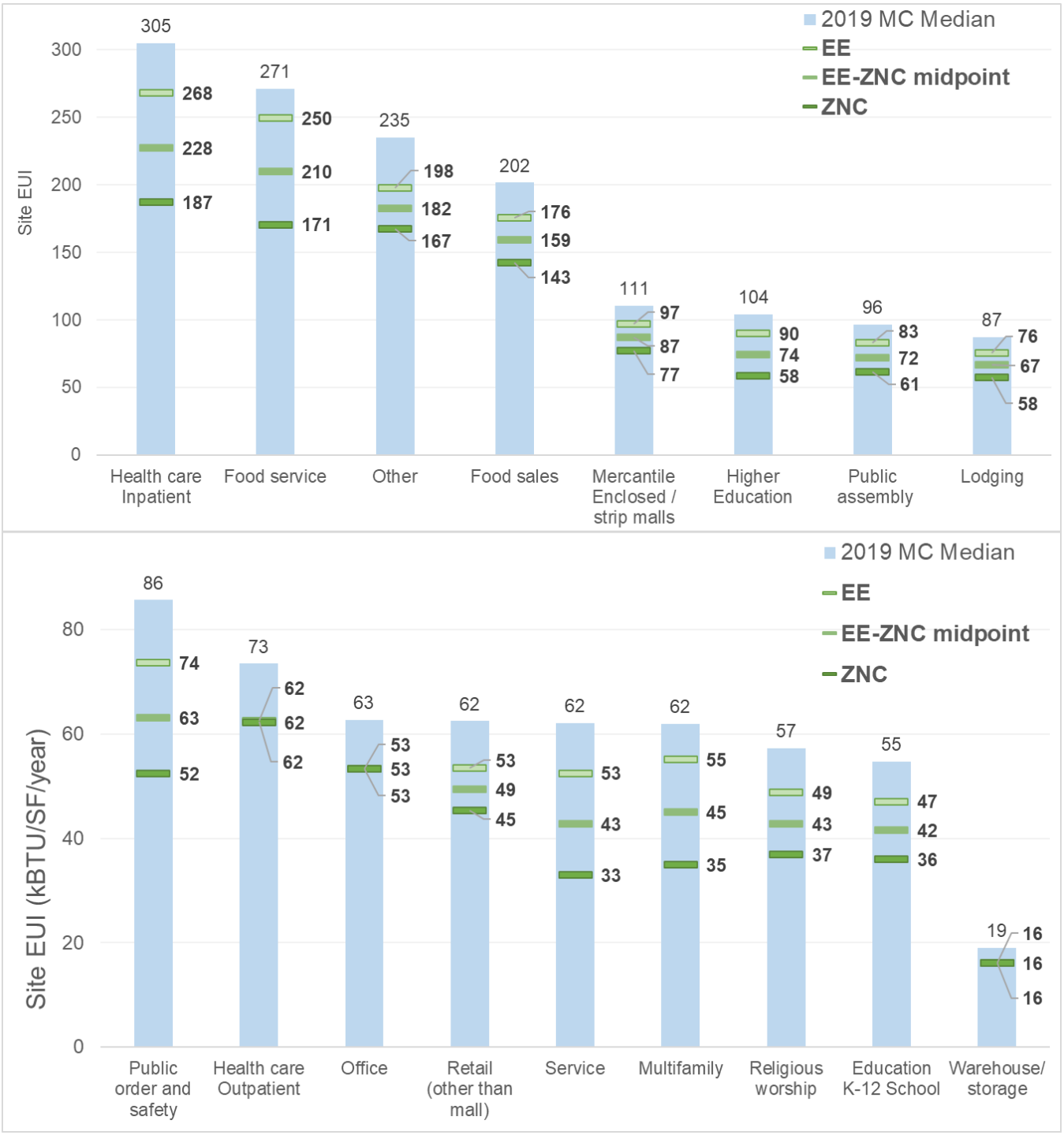

Figure 1. Options for Site EUI targets in Montgomery County based on this study. Building types that are already substantially all-electric, such as Health Care Outpatient, Office, and Warehouse/Storage have nearly identical EE and ZNC targets. Multifamily data median EUI comes from Washington, DC 2019 benchmarking information as multifamily buildings are not currently subject to Montgomery County's benchmarking law.

Energy Use Impacts

Significant energy savings would result from covered buildings reaching any of the identified site EUI targets, both in electricity use and on-site fuel burning. Projected energy savings compared to estimated 2019 energy use is shown in Table 1.

The eliminated energy use is primarily driven by reduction in on-site fuel burning through energy efficiency and electrification. Electric energy efficiency is also incorporated, though reductions in overall electricity use are partially offset by increases due to electrification of fossil fuel systems. Note that electricity savings are lower for the ZNC target than for the EE target. This is because achieving the ZNC target involves more electrification, which increases electricity use, albeit through more efficient electric systems and equipment. The total energy reduction in gas use outweighs the increase in electricity use from electrification. Note that this study did not project new construction trends, so energy use changes only relate to existing buildings.

Table 1. Energy Use Impacts for final Site EUI target options compared to baseline 2019 countywide building energy use.

Countywide Energy Impact of BEPS	Energy Efficiency (EE) Target	EE-ZNC midpoint	Zero-Net-Carbon (ZNC) Compatible Target
Reduction in Site EUI (annual)	23%	28%	35%
Reduction in On-site Fossil Fuel Emissions	46%	66%	86%

Setting the site EUI standards to the ZNC target shows estimated reductions of on-site fossil fuel emissions by 86% by the year of the final standards for the latest group ("final year"). This is because electrification is one of the deepest forms of energy efficiency since electric equipment operates at a much higher efficiency than fuel-fired equipment. Therefore, most buildings would need to electrify their on-site fossil fuel burning systems to reduce site EUI to the level necessary to meet the ZNC standards. The elimination of on-site fuel burning will have a direct contribution to local air quality improvements. The eliminated energy use is primarily driven by reduction in on-site fuel burning through energy efficiency and electrification. The ZNC target provides overall site EUI reductions (for all fuels) of 35%.

In contrast, the EE target is estimated to reduce on-site emissions by 46%, allowing more on-site emissions from fuel-fired equipment that remains in buildings by the final year of compliance compared to the ZNC target. The EE target provides overall site EUI reductions of 23%.

Greenhouse Gas Emissions Impacts

Overall, greenhouse gas emissions reductions result from improved efficiency (i.e., using less energy to perform the same task), electrification of fossil-fuel burning systems, and the decarbonization of the electricity grid. The annual and cumulative greenhouse gas (GHG) impact of each building performance standard option was calculated using current and projected electricity supply and compliance deadlines of different building types.

If the electricity supply is maintained at today's level of emissions, building efficiency improvements would still yield emissions savings from the proposed BEPS policy. Assuming no change to today's electricity grid, the EE target would provide GHG reductions of 19% and the ZNC target would provide GHG reductions of 26%.

Maryland's current Renewable Portfolio Standard is currently set at a maximum of 50% renewable electricity by 2030. The County's Climate Action Plan (CAP) endeavors for a 100% carbon free electricity supply by 2035 (i.e., considered "zero-emissions" or "carbon-free" by the by the time BEPS is fully implemented[4]).

If the emissions intensity (EEI, in kilograms of carbon dioxide equivalent per kilowatt-hour, kgCO2e/kWh) for electricity supplied to the County was zero the annual emissions from building energy use would drop from the 2019 baseline by 83% for covered buildings reaching the EE target or 94% for covered buildings reaching the ZNC target.

[4] Supra, page 88.

While BEPS may appear to have a relatively lesser impact on community-wide emissions compared to transitioning the electric grid to carbon-free sources, the proposed BEPS policy's emphasis on energy efficiency allows building owners to "right-size" their energy use such that the amount of clean energy needed to meet building demand via the grid is less than a business-as-usual scenario. The building energy performance standard would do two things to help achieve the county's climate goals: 1) the reduction in electricity use through efficiency measures would ease the burden on the supply side to provide electricity from carbon-free sources, and 2) the reduction of on-site emissions through fossil fuel efficiency and eventual electrification may be the only way to achieve carbon neutrality.

Policy options to further credit renewable energy in pursuit of BEPS targets were outside of the scope of this study, thus not fully evaluated. Considering this type of credit could serve as a flexible tool for building owners to meet targets in the spirit of the County's climate goals.

The effect of the BEPS policy overlaid with potential electricity supply changes is shown in Table 2.

Table 2: The annual emissions reduction impact of the site EUI targets in this study. Reductions are of annual emissions at the final target year (e.g., 2037 or beyond).

Annual Million Metric Tons CO_2e (% reduction from baseline)	**No BEPS**	**EE**	**EE-ZNC midpoint**	**ZNC**
Electricity supply does not change from today	1.53 (0%)	1.24 (19%)	1.19 (22%)	1.13 (26%)
"Carbon-free" electricity supply	0.45 (70%)	0.26 (83%)	0.18 (88%)	0.09 (94%)

Case Studies that Evaluated the Technical Feasibility of Performance Targets

The study team selected buildings from various building types to test if the ZNC target – the lowest site EUI target – is technically achievable, and to estimate the total capital cost and energy cost savings of meeting or exceeding the ZNC target. The nine case study examples were meant to be representative of Montgomery County's building stock that would have to undertake building energy upgrades to meet a potential BEPS target.

Each case study building was analyzed through a virtual audit to determine the applicable measures for three retrofit packages:

- **A ZNC Target Package**: what measures are needed to reach the building's ZNC Target. This is meant to test whether the ZNC target (and by extension the mid-point target) is technically feasible with today's technology.
- **An EE Target Package:** what measures are needed to reach the building's EE Target. Measures that maximized a building's return on investment were prioritized. In some case studies, partial electrification of end uses may meet this target but some further-optimized, fossil-fuel based systems may remain in the building.
- **A Less-than-Five-Year Payback Package:** what measures may be recommended in the near term without contradicting long-term deep energy efficiency work. These measure packages represent the types of low-cost and lower-savings measures often recommended during standard energy audits and may be useful in reviewing progress toward interim targets. These measures are often investigated by buildings first, regardless of existing equipment replacement cycles, because they can provide cost savings after less than five years of operation. Five years is also an estimate of the capital planning cycle length for many buildings. The study team selected a "do no harm approach" that did not include installation of new fossil-fuel equipment. These measures were analyzed to compare this type of work

and the ZNC target packages needed to achieve larger climate goals. Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Most buildings have substantial work to do in order to reach the ZNC target; however, this does not mean reaching the targets is impossible. In all case studies, the ZNC target was technically achievable with existing technology and systems through a ZNC Target Package combining energy efficiency, electrification, and on-site solar PV.

In general, the highest energy savings correspond with relatively high upfront cost, with that cost mainly driven by electrification measures in fossil fuel-heated buildings. While best estimates are used to develop total retrofit costs for measures, each measure is subject to a wide variety of factors within and outside the building. Each cost estimate should be interpreted as a rough estimate that is the result of a high-level review of building conditions and applicable measures.

Capital costs identified via the case studies represent total equipment and labor costs. These total costs evaluate the full cost of a new system, not incremental costs of a more efficient system compared to costs the building would already incur to replace equipment in-kind at the end of its useful life. System electrification or upgrade is assumed to take place at the end of useful life of existing equipment, which was due to occur before the final BEPS year in all case study buildings. Total costs also do not include any other factors that may improve the financial performance of the investment, such as utility incentives, tax credits or depreciation, or financing through entities such as the Montgomery County Green Bank. Savings do not account for labor cost savings from new equipment (e.g., from reduced equipment maintenance or facility maintenance requests due to improved tenant comfort).

Costs for the ZNC Target Package ranged from $11 to $36 per square foot with an average $/SF across all case study buildings of approximately $25.08/SF to reach the ZNC target, where multiple electrification measures drive up the capital cost intensity. This implies some realistic level of expected capital outlay across building typologies. The ZNC Target Package resulted in savings of $0.30 to $1.50 per square foot with an ROI between 2% and 5%. Though the ZNC Target Package resulted in far greater levels of efficiency via electrification, annual dollar savings per square foot are more modest due to the relatively higher cost of electricity compared to natural gas today.

Costs for the EE Target Package ranged from $10 to $26 per square foot with an average $/SF for applicable buildings of approximately $17.10/SF. Similar to the ZNC Target Packages, electrification measures, where included, drive up the capital cost intensity. These EE Target Packages resulted in savings of $0.35 to $1.40 per square foot with an ROI between 3% and 10%. Note that some buildings' EE targets were the same as their respective ZNC targets.

Costs for the Less-than-Five Year Payback Package ranged from $0.20 to $3.60 per square foot and resulted in savings of $0.10 to $1 per square foot with simple payback between 2 and 4 years (per the package parameters). In most cases, the EUI of this package is sufficient to get a building to the first interim ZNC target. However, further work is needed in most cases to meet the EE target and in all cases to reach the ZNC Target.

As a result of meeting the ZNC or EE targets, the case study buildings would significantly reduce GHG emissions. The emissions reductions achieved by implementing the ZNC Target packages are substantial Assuming today's electricity supply, the ZNC Target would reduce the case study buildings emissions by 36% on average. A ZNC target yields an average reduction of 99% with a completely emissions-free grid.

For comparison, the emissions reductions achieved by setting the standards using the EE Target method would lead to less decarbonization. Assuming today's electricity supply, the EE Target would reduce the case study buildings emissions by 32% on average. With a completely emissions-free grid, emissions are reduced by 86%.

Table 3. The emissions reduction impact of the site EUI targets in this study among case study buildings.

% Emissions Reduction in Case Study Buildings (Emissions reductions range)	**EE**	**ZNC**
Electricity supply does not change from today	32% average (Range: 0-52%)	36% average (Range: 22%-62%)
"Carbon-free" electricity supply	86% average (Range: 64% - 100%)	99% average (Range: 95%-100%)

Estimated Total Costs and Benefits for Owners of Covered Buildings

The study team calculated the annual and cumulative energy use and associated costs and emissions for the years 2021-2039 without and with a BEPS policy. No capital cost was assumed under the baseline case, as the study considered the total capital cost of upgrades without including business as usual equipment replacements.

The eliminated energy use is primarily driven by reduction in on-site fuel burning through energy efficiency and electrification. Electric energy efficiency is also incorporated, though those reductions in overall electricity use are partially offset by increases due to electrification of fossil fuel systems.

The results of the countywide model without a BEPS policy intervention are shown in Table 4.

Table 4. The estimated covered buildings' energy and GHG emissions characteristics, both annual and cumulative over the study period.

Cumulative Countywide Baseline 2021-2039	**Annual Total (2021)**	**2021-2039 Cumulative Totals (without a BEPS policy)**
Electricity Use [Billion BTU]	12,212	244,200
Gas Use [Billion BTU]	6,574	131,500
GHG emissions of covered buildings [Million tonsCO_2e]	1.33	16.54
Energy Cost [Million$]	$602	$10,860
Capital Cost [Million$]	N/A	N/A

The three potential BEPS target approaches were evaluated for the impact on energy and emissions, energy costs, and capital costs. The countywide results are shown in Table 5. The ZNC target requires the deepest energy use reductions of the three targets, and results in the greatest emissions reductions, both on-site and from purchased electricity.

Table 5. Estimated countywide impact of three building energy performance targets, summing cost, energy savings, and GHG for each Target Method.

Countywide Impact of BEPS 2021 to 2039	**No BEPS**	**Energy Efficiency (EE)**	**EE-ZNC midpoint**	**Zero-Net-Carbon (ZNC) Compatible**	
Electricity Use (2021-2039 cumulative total)	244,200	231,900	233,600	235,600	Billion BTU
Electricity Site Energy Savings *(2021-2039 cumulative total)*	N/A	12,300	10,600	8,600	Billion BTU
% Electricity Energy Savings (2021-2039 cumulative total)	N/A	5%	4%	4%	% lower than baseline cumulative
% Electricity Energy Savings (annual, final year)	N/A	10%	8%	8%	% lower than baseline
Gas Use (2021-2039 cumulative total)	131,500	103,000	91,800	78,500	Billion BTU
Gas Site Energy Savings (2021-2039 cumulative total)	N/A	28,500	39,700	53,000	Billion BTU
% Gas Energy Savings (2021-2039 cumulative total)	N/A	22%	30%	40%	% lower than baseline cumulative
% Gas Energy Savings (annual in final year)	N/A	46%	66%	86%	% lower than baseline
GHG emissions of covered buildings (2021-2039 cumulative total, with grid cleaning)	16.54	14.85	14.25	13.55	Million Tons CO_2e
GHG Savings of Policy	0	1.70	2.30	2.99	Million Tons CO_2e
GHG % Savings of Policy	N/A	10%	14%	18%	% lower than baseline cumulative
GHG Savings by grid cleaning (external to a BEPS program)	14	14	14	14	Million Tons CO_2e
Annual GHG Reduction Including Grid Cleaning (% lower than 2019 baseline)	76%	87%	92%	97%	Percent lower than annual baseline
Energy Costs (2021-2039 cumulative total)	$10.86	$10.05	$9.97	$9.88	Billion
Energy Cost Savings (2021-2039 cumulative total)	$0	$0.82	$0.89	$0.98	Billion
% Energy Cost Savings (2021-2039 cumulative total)	0%	8%	8%	9%	% lower than baseline cumulative
Total Capital Cost* (2021-2039 cumulative total)	$0.00	$1.66	$2.41	$3.22	Billion
Carbon Abatement Cost (2021 - 2039 average)		$980	$1,050	$1,080	dollars / ton CO_2e
Total Capital Cost / SF	0	$7.20	$10.40	$13.90	$ / SF

**Total capital cost does not include avoided cost from the replacement of existing equipment. Cost does not include financial assistance available for energy efficiency retrofits.*

TECHNICAL ANALYSIS CONCLUSIONS

These findings stood out to the study team as key takeaways:

1) While the County has not taken a prescriptive approach to this policy, as the BEPS target gets more stringent, the variety of options to comply with the standard are more limited such that electrification becomes necessary to meet the final target, as illustrated by the case studies.
2) Achieving the ZNC target was technically achievable across the building types analyzed as case studies. In some cases, the ZNC target was met via measures that had significant costs and with a low ROI, especially where electrification would be required to meet the target.
3) Most, but not all, buildings would need to electrify nearly all fossil fuel use to meet the ZNC target. In certain cases, electrification of all end uses was not always the most cost-effective path to meet the whole-building site EUI targets. Other measures, such as on-site solar PV or other efficiency measures, were sometimes more cost effective than the complete elimination of on-site fossil fuels.
4) There is little to no difference between the EE target and the ZNC target for building occupancy types that currently have limited use of on-site fossil fuels, such as commercial offices. The difference between targets is large for building types that have greater use of fossil-fuel systems, such as multifamily and lodging (e.g., hotels, motels). Choosing where to set the targets should consider the impact to these fossil-fuel-dependent building types.
5) A BEPS final year target set to the ZNC target, if implemented along with the realization of a 100% carbon-free electricity supply, would result in the deepest emissions reductions. The EE and EE-ZNC midpoint targets would result in enough on-site combustion to remain in buildings that the County's CAP goal of zero GHG emissions by 2035 is unattainable.
6) The ZNC target would force nearly complete electrification of buildings subject to the BEPS policy. It would be technically attainable, although for some buildings the costs and level of effort, including work inside tenant spaces, would be significant.
7) Selecting an EE target would delay achieving the County's deepest emissions reduction goals because it would allow new fossil-fuel equipment to be installed, locking buildings into a long period of fossil fuel use until the next replacement cycle.
8) Countywide emissions would be reduced if buildings were to meet either the EE or ZNC site EUI targets, regardless of whether the electricity supply becomes emission-free or not. Even with today's relatively fossil-fuel powered electricity supply, efficiency and electrification of buildings would result in significant total emissions reductions compared to a business-as-usual scenario (see Table 19).

BUILDING COST – BENEFIT CASE STUDY OVERVIEW

To test the viability of the targets, the analysis team chose nine building examples in Montgomery County and developed multiple retrofit packages. Each building was assigned a target using the proposed methodology, and a package of energy-reducing measures was created. The technical viability and economics of reaching the targets confirmed that, at least for the types of buildings exemplified in this technical analysis, the targets are reachable. High-level findings are contained in the "Building Cost-Benefit Case Study" section of this report.

The analysis team selected buildings from various occupancy types to show examples of target calculations and energy measure packages to meet a potential performance standard. These nine case study examples are meant to be representative of Montgomery County's building stock that would have to meet a potential BEPS target and have current energy performance that would trigger the need to implement retrofits in order to achieve compliance with the proposed BEPS policy.

Each case study includes a brief description of the key building systems, a summary of the square footage of each property use type, whole building ENERGY STAR score for reference (if available), and calculated site energy use intensity (EUI) for 2019. EUI is a measure of the energy usage at a building per square foot where all fuels have been converted to a common unit of measure, typically thousand Btu per square foot (kBTU / SF). The case studies were anonymized by putting a range on the EUI, which in turn created a range of baselines and interim targets. The methodology describing the utility analysis process is described in the *Utility End Use Assessment* section.

The ***Methodology*** section in Appendix V describes several important aspects of this analysis.

Example Buildings and Pathways to Reach Energy Performance Targets

Each case study building was analyzed through a virtual desk audit to determine the applicable measures for three retrofit packages:

- A Zero Net Carbon-Compatible Target Package: what measures are needed to reach the building's ZNC Target.
- An Energy Efficiency Target Package: what measures are needed to reach the building's EE target.
- A Less-than-Five-Year Payback Package: what measures are identified in a typical energy audit.

The ZNC Target Package is intended to achieve the building's hypothetical ZNC target established using the target-setting methodology in *Site Energy Use Intensity Performance Targets*. The EE Target Package is intended to achieve the building's hypothetical EE target established using the target-setting methodology in *Site Energy Use Intensity Performance Targets*.

Each building has a Less-than-Five-Year Payback Package; in most cases, the EUI of this package is sufficient to get a building to the first interim ZNC target. However, further work is needed in most cases to meet the EE target, and in all cases to reach the ZNC Target. Note that in some building cases, there are no differences between the EE target EUI and the ZNC Target EUI.

The following table contains the baseline EUI for each case study building, the two chosen target EUIs, the projected EUI of the ZNC Target Package, and the projected EUI of the Less-than-Five-Year Payback Package. As seen in Table 6 and Figure 2, most buildings have substantial work to do in order to reach the ZNC target; however, this does not mean reaching the targets are impossible. Each building's ZNC Target Package in this analysis either meets or exceeds the ZNC Target EUI.

Table 6. Basic overview of each building typology, potential EE and ZNC targets, ZNC Target Package, EE Target Package, and Less-than-Five-Year Payback Package.

#	**Typology** Sub-type	**Floor Area [SF]**	**Baseline Site EUI**	**ZNC Target EUI**	**ZNC Interim Target 1 EUI**	**ZNC Interim Target 2 EUI**	**EE Target EUI**	**EE Interim Target 1 EUI**	**EE Interim Target 2 EUI**	**ZNC Target Package EUI**	**EE Target Package EUI**	**Less-than-Five Year Payback Package EUI**
1	**Office** (p 79) Class A	200,000 – 225,000	70 – 80	53.4	63 – 72	57 – 64	53.4	49 – 53	67 – 75	49 – 53	49 – 53	67 – 75
2	**Office** (p 89) Mixed-fuel HVAC	250,000 – 275,000	80 – 90	57.8	71 – 80	62 – 70	57.9	52 – 57	67 – 75	52 – 57	52 – 57	67 – 75
3	**Office** (p 95) Older All-Electric	225,000 – 250,000	80 – 90	53.4	71 – 80	62 – 70	53.4	47 – 53	57 – 64	47 – 53	47 – 53	57 – 64
4	**Multifamily** (p 109) New – Tall	125,000 – 150,000	50 – 60	38.7	46 – 53	42 – 47	59.1	35 – 38	50 – 60	35 – 38	N/A	50 – 60
5	**Multifamily** (p 119) Old – Tall	125,000 – 150,000	70 – 80	35.4	58 – 65	45 – 50	55.1	65 – 72	60 – 65	32 - 35	50 – 57	64 – 73
6	**Multifamily** (p 131) Short / Garden	50,000 – 75,000	115 – 125	35.4	90 – 95	60 – 65	55.1	95 – 102	75 – 80	31 – 34	51 – 55	107 – 116
7	**Lodging** (p 143) Full-service hotel	150,000 – 175,000	115 – 125	57.8	95 – 105	75 – 85	75.7	102 – 110	88 – 95	53 – 57	72 – 76	94 – 102
8	**Lodging** (p 156) Partial-service hotel	200,000 – 225,000	125 – 135	57.8	101 -110	77 – 85	75.7	108 – 115	90 – 96	53 – 57	72 – 76	99 – 107
9	**Worship** (p 168)	75,000 – 100,000	80 – 90	36.4	65 – 72	50 – 56	47.9	70 – 77	59 – 64	33 – 36	45 – 48	72 – 81

**the blue page numbers are links to the case studies in this report*

Figure 2 on the following page contains a subset of the information contained in Table 6 arranged in graphical format. An asterisk is noted to call out the all-electric building in the case studies.

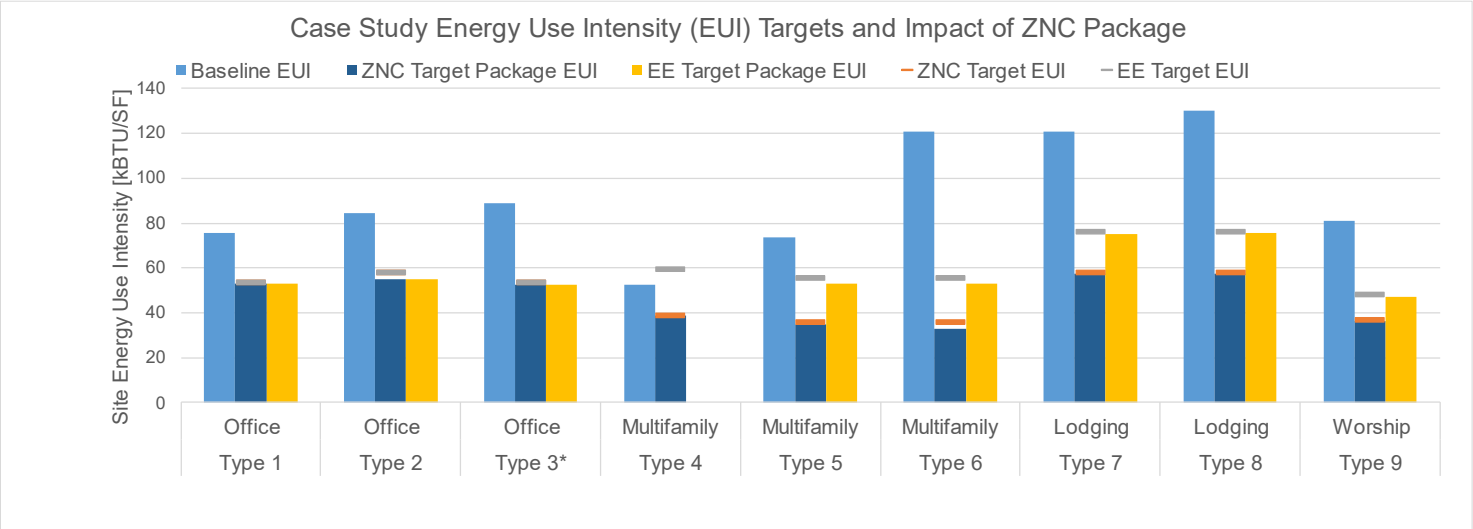

Figure 2. Comparisons of current energy usage of case study buildings to proposed targets and the end results of the ZNC Target Package and EE Target Package. The asterisk denotes an all-electric building.

Table 7 on the following page contains a financial overview of each of the packages. The costs associated with the Less-than-Five-Year Payback Package are often small (most buildings were less than $2 / SF) but generate moderate energy savings; the ZNC Target Package costs are often much higher than the Less-than-Five-Year Payback Package but generate deeper energy savings. The EE Target Package typically falls somewhere in the middle, with buildings further away from the EE target having higher costs.

Total costs were used, without incorporating potential cost reduction avenues such as:

1) avoided cost of business-as-usual equipment replacement,
2) financial assistance from myriad sources, including EmPOWER incentives and Green Bank financing,
3) incentives for efficiency work, or
4) cost pass-through to commercial and residential tenants.

Table 7. Basic overview of ZNC Target Package, EE Target Package, and Less-than-Five-Year Payback Package financials. Building 4's EUI is below the EE Target; no EE package is included.

#	**Primary Occupancy Type** Sub-type	**ZNC Target Package Cost / sq. ft.**	**ZNC Target Package Annual Savings / sq. ft.**	**ZNC Target Package Simple Payback (years)**	**ZNC Target Package ROI (%)**	**EE Target Package Cost / sq. ft.**	**EE Target Package Annual Savings / sq. ft.**	**EE Target Package Simple Payback (years)**	**EE Target Package ROI (%)**	**Less-than-Five Year Payback Package Cost / sq. ft.**	**Less-than-Five Year Payback Package Annual Savings / sq. ft.**	**Less-than-Five-Year Package Simple Payback (years)**	**Less-than-Five Year Payback Package ROI (%)**
1	**Office** (p 79) Class A	$23 - $26	$0.60 - $0.80	35.1	3%	$23 - $26	$0.60 - $0.80	35.1	3%	$0.80 - $1	$0.30 - $0.40	2.0	49%
2	**Office** (p 89) Mixed-fuel HVAC	$16 - $19	$0.60 - $0.80	26.4	4%	$16 - $19	$0.60 - $0.80	26.4	4%	$1.60 - $1.80	$0.40 - $0.50	4.0	25%
3	**Office** (p 95) Older All-Electric	$25 - $28	$1.30 - $1.50	19.2	5%	$25 - $28	$1.30 - $1.50	19.2	5%	$3.40 - $3.60	$0.90 - $1	3.6	28%
4	**Multifamily** (p 109) New - Tall	$7 - $10	$0.30 - $0.50	31.9	3%	N/A	N/A	N/A	N/A	$0 - $0.20	$0 - $0.10	3.5	28%
5	**Multifamily** (p 119) Old – Tall	$16 - $19	$0.30 - $0.50	57.1	2%	$9 - $12	$0.90 - $1.10	28.3	4%	$0.60 - $0.80	$0.20 - $0.30	3.1	32%
6	**Multifamily** (p 131) Short / Garden	$25 - $28	$0.90 - $1.10	26.8	4%	$20 - $23	$0.70 - $0.90	21.5	5%	$0.60 - $0.80	$0.10 - $0.20	2.9	35%
7	**Lodging** (p 143) Full service hotel	$33 - $36	$0.70 - $0.90	48.9	2%	$10 - $13	$0.70 - $0.90	33.1	7%	$1.90 - $2.10	$0.50 - $0.60	3.5	28%
8	**Lodging** (p 156) Partial-service hotel	$31 - $34	$0.90 - $1.10	34.2	3%	$8 - $11	$0.90 - $1.10	17.3	10%	$3.30 - $3.50	$0.80 - $1.00	3.5	29%
9	**Worship** (p 168)	$33 - $36	$0.90 - $1.10	37.9	3%	$14 - $17	$1.10 - $1.30	13.3	8%	$0.50 - $0.70	$0.20 - $0.30	2.8	35%

**the blue page numbers are links to the case studies in this report*

Figure 3 on the following page contains a subset of the information contained in Table 7 arranged in graphical format. An asterisk is noted to call out the all-electric building in the case studies.

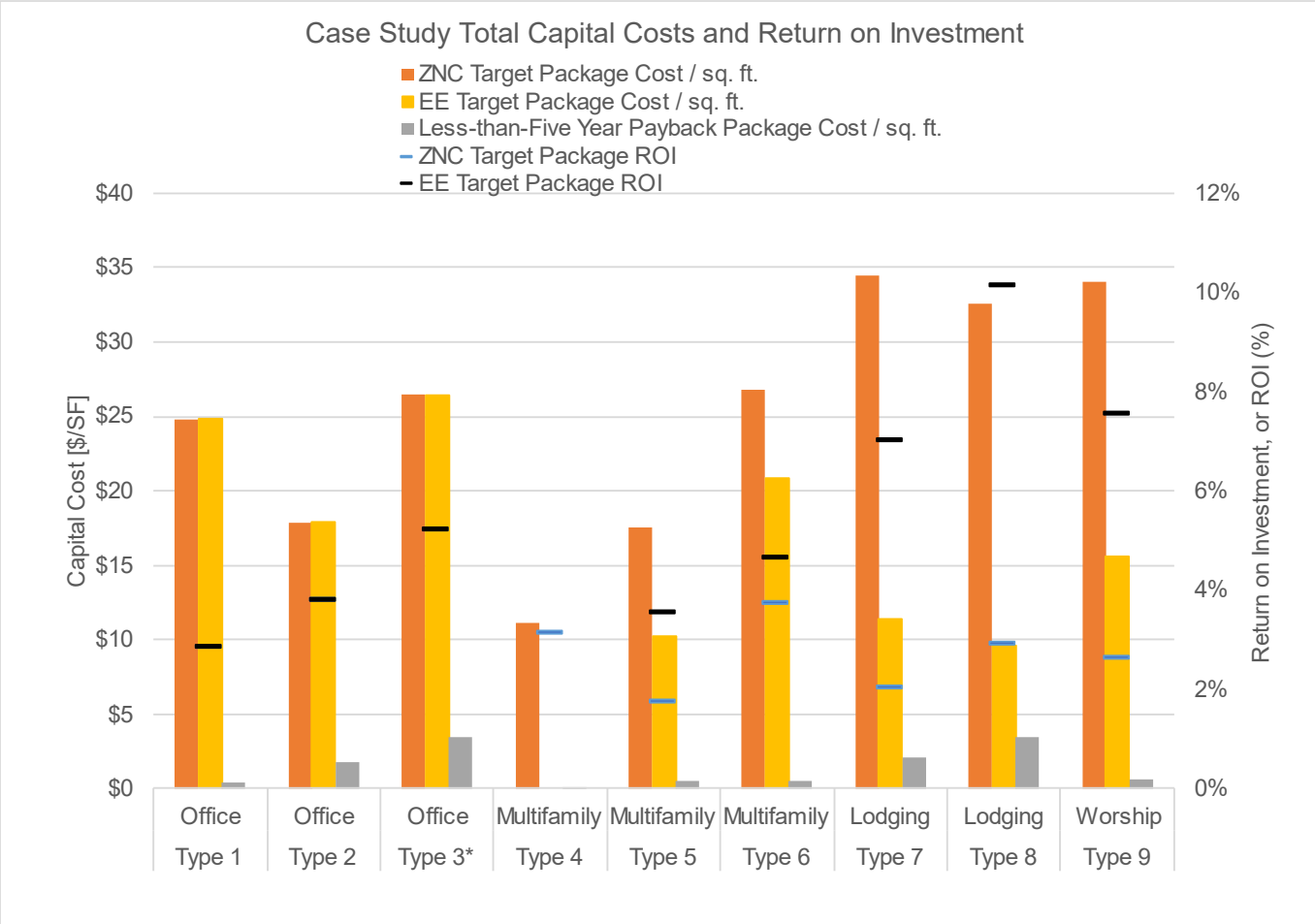

Figure 3. Costs to implement the ZNC Target Package identified for each case study building compared to the EE Target Package and Less-than-Five-Year Payback Package. ROI for the ZNC Target Package is included as a blue line and ROI for the EE Target Package is included as a black line. The ROI for the Less-than-Five Year target is higher than 20% in all cases, thus omitted from this figure. The asterisk denotes an all-electric building.

As seen in Table 6, Table 7, Figure 2, and Figure 3, each building is able to reach the ZNC Target, indicating these targets are technically achievable using today's technology. While the costs for implementing these packages vary significantly by building, the following general conclusions apply:

- Most major in-building equipment (i.e., mechanical equipment) is likely to be replaced prior to 2035. This capital cost can be redirected toward deeper retrofit projects. This creates a lower "effective" cost of compliance, but it should be noted these baseline capital costs are highly building dependent. Financial incentives and financing can fluctuate and are building-specific at a level outside the scope of this report. Baseline capital cost outlay, financial incentives, and financing are not included in this report.
- Utility cost savings from the EE Target Packages are generally similar to the ZNC Target Package for a specific site. Savings do not account for labor cost savings from new equipment (e.g., from reduced equipment maintenance or facility maintenance requests due to improved tenant comfort).
- ZNC Target Packages sometimes have measures that replace existing systems that would otherwise be optimized in EE Target Packages and Less-than-Five-Year Payback Packages. This presents potential risk for future replacement of fossil-fuel-fired equipment with new fossil-fuel-fired equipment.

- Some EE Target Packages—namely, the ones for offices—are the same as the ZNC Target Packages, as their targets are identical.
- The Less-than-Five-Year Payback Package is not sufficient to meet either the EE or ZNC targets in the vast majority of cases, indicating that deeper retrofits are necessary to meet Montgomery County's emissions goals for 2035.
- Building typologies with substantial costs associated with the Less-than-Five-Year Payback Package also have significant savings associated with implementing these measures. In all cases, the return on investment makes financial sense for these projects even with the upfront cost.
- Utility cost savings from the Less-than-Five-Year Payback Package are on average 50% (range: 3%-90%) of the utility cost savings for the ZNC Target Package for a specific site. Savings do not account for labor cost savings from new equipment (e.g., from reduced equipment maintenance or facility maintenance requests due to improved tenant comfort).

Summarizing the case studies into broad building types, the average capital cost intensity for offices, multifamily, and hotels/lodging under the ZNC and EE targets is shown in Figure 4. The chosen building typologies have a relatively consistent ZNC Target Package capital cost intensity in the range of $20 - $30 / SF (with an average $/SF across all case study buildings of approximately $22.85/SF) to reach the final target year, where multiple electrification measures drive up the capital cost intensity. Similarly, the EE Target Package capital cost intensity is between $9.50 - $26.50 / SF. This implies a significant investment will be required across building typologies.

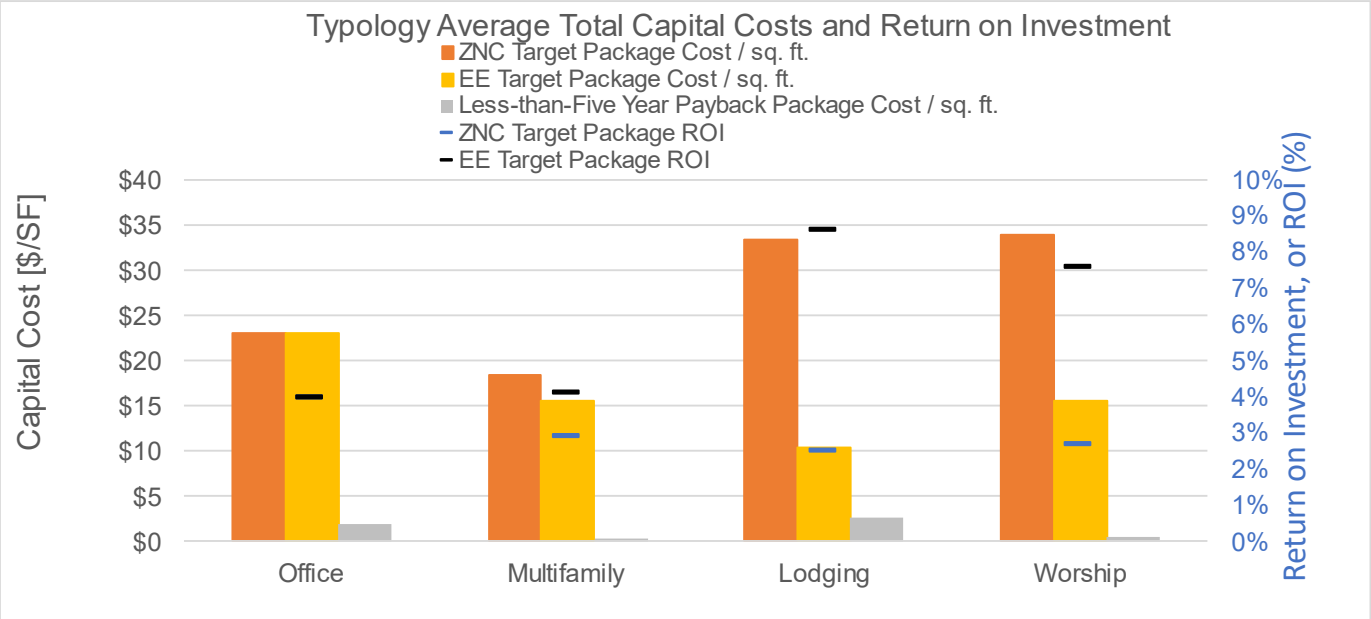

Figure 4. Costs to implement the ZNC Target Package identified for each building typology compared to the EE Target Package and Less-than-Five-Year Payback Package. ROI for the ZNC Target Package is also included as a blue line and ROI for the EE Target Package is included as a black line. The ROI for the Less-than-Five Year target is higher than 20% in all cases, thus omitted from this figure.

Figure 5 compares total capital costs and percent site energy savings for the ZNC target, EE target, and Less-than-Five-Year Payback Package for each building typology. The data in Figure 5 shows that, in general, higher capital cost expense yields larger energy savings

towards the target. The highest savings numbers correspond to incredibly deep energy savings, but at a relatively high cost, mainly driven by electrification measures in fuel-heated buildings.

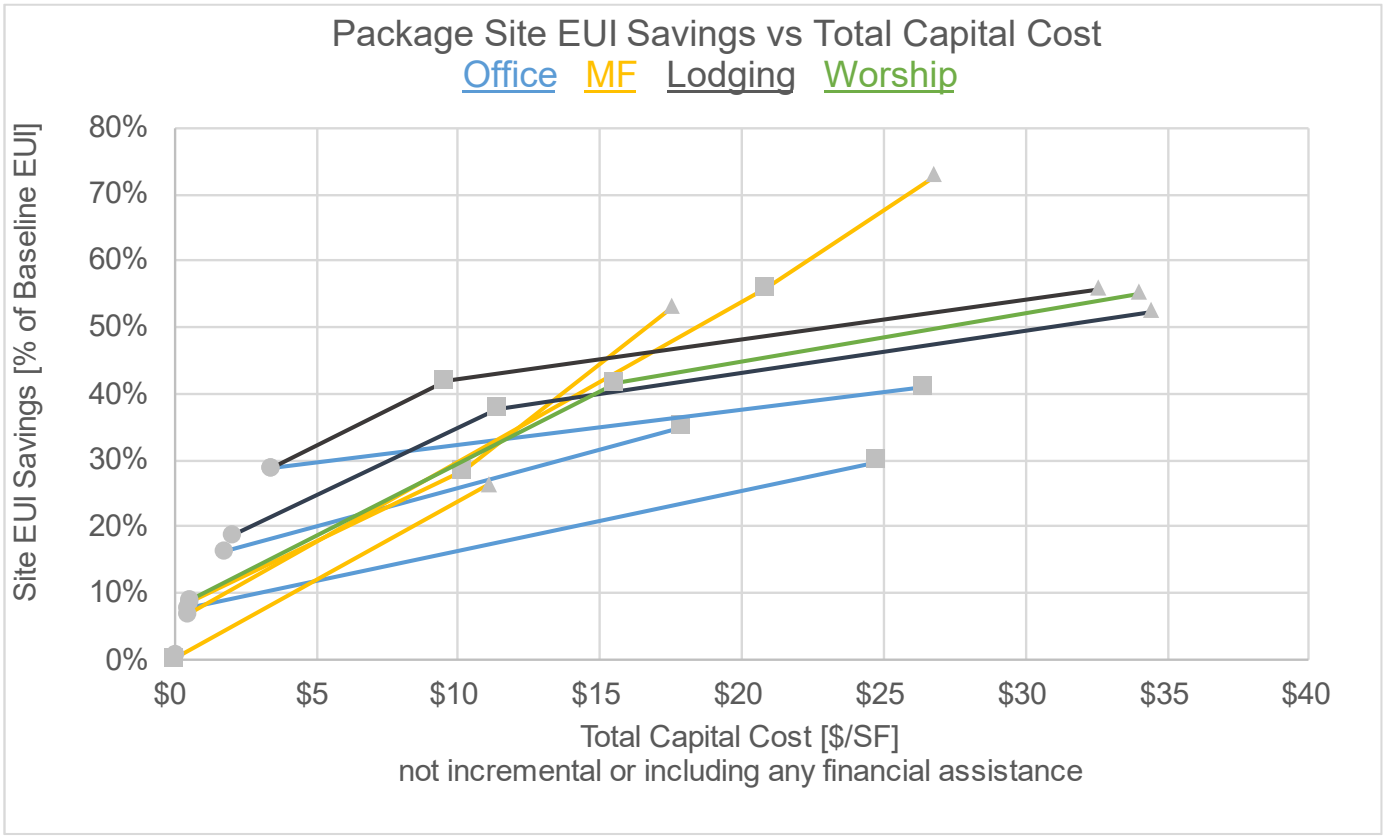

Figure 5. Comparison of capital cost to energy reduction trends, showing that generally more money is needed for deeper savings. This is partly driven by the fossil fuel dominated buildings having high starting EUIs. With electrification being one of the more expensive measures, those buildings spend the most and have the highest site EUI savings from electrification. In this figure, circles represent the Less-than-Five-Year Payback Package, squares represent the EE Target Package, and triangles represent the ZNC Target Package. Building typologies are color-coded.

Greenhouse Gas Impact

The energy reductions that could be achieved under different BEPS targets are converted to greenhouse gas emissions to estimate the change in energy-based emissions of the buildings in their current state, and if the EE or ZNC Package is adopted. Two grid forecasting scenarios are modeled to account for possible changes in the electric grid emissions intensity – in units of $kgCO_2e$ / kBTU:

Table 8. Electricity and natural gas emissions intensities used in this technical analysis.

	Gas $kgCO_2e/kBTU$	Elec $kgCO_2e/kBTU$
Today's Electricity Supply[5]	0.05472	0.0957
50% Renewable Electricity Supply[6]	0.05472	0.0492
100% Renewable Electricity Supply[7]	0.05472	0.0027

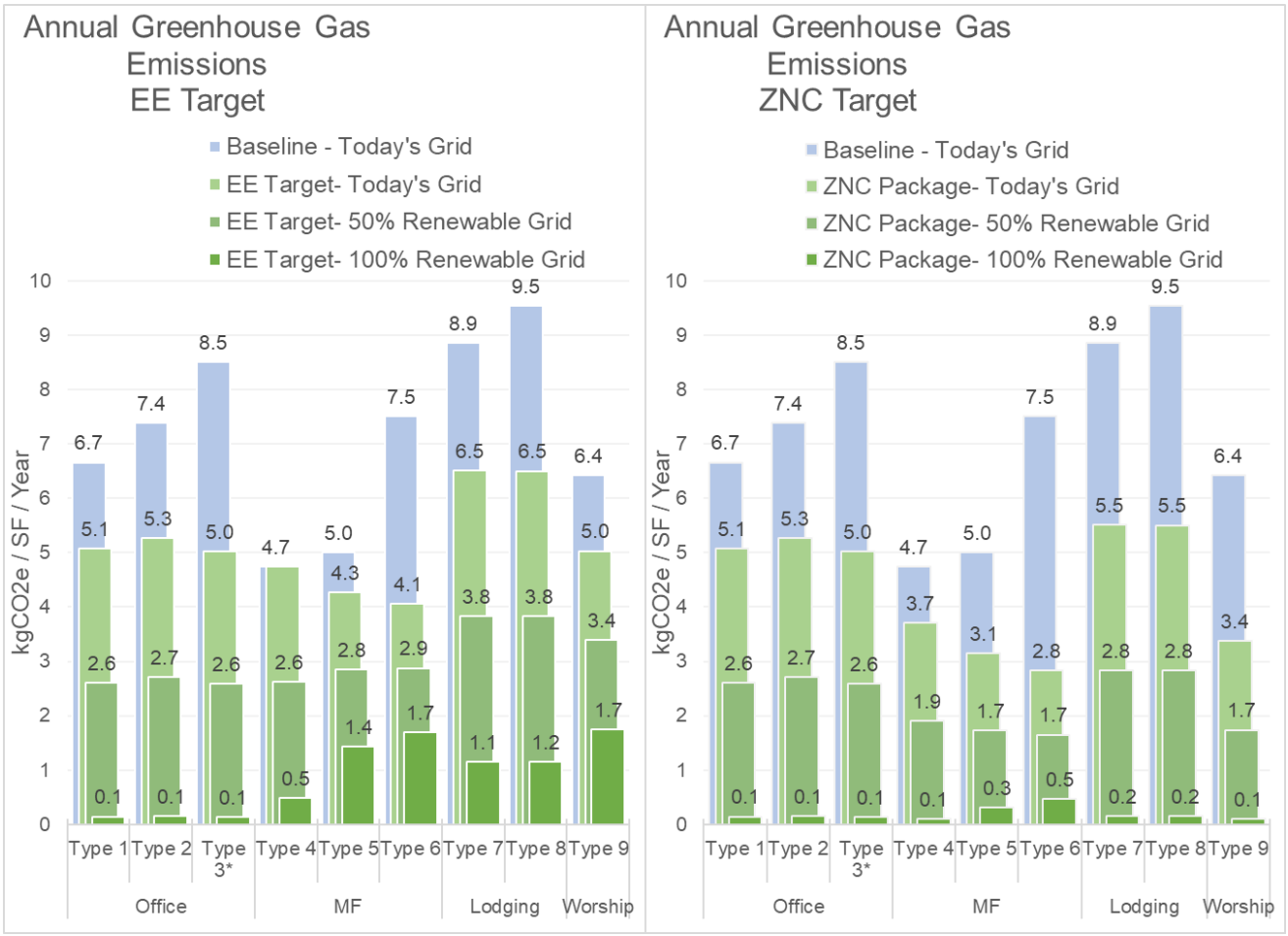

Figure 6. Greenhouse gas emissions impact of implementing the ZNC Target packages (right) under different potential electricity scenarios. At left, an estimate of the emissions reductions if the EE Targets were used, allowing fewer high-cost measures such as electrification, to be used to meet the targets. The asterisk denotes an all-electric building.

[5] See Appendix VIII for GHG emissions factors data sources from the MC GHG Inventory, used for gas and electricity.

[6] This value corresponds roughly with the Renewable Portfolio Standard (RPS), which requires 50% of the electricity supply to come from renewable sources. The electricity value is half of today's emissions intensity, which is roughly 94% non-renewable. The assumption is that non-renewable sources (gas, oil, coal, and nuclear) will be ramped down evenly to meet the RPS. See page 2 of Pepco "Environmental Fuel Source Information" for June 2020, corresponding to calendar year 2019. https://www.pepco.com/MyAccount/MyBillUsage/Pages/ViewBillInserts.aspx

[7] Assumes ~3% of electricity consumption is from emitting sources, but these are offset through renewable purchases or other offset methods.

The emissions reductions achieved by implementing the ZNC Target packages are substantial. Assuming today's electricity supply, the packages reduce GHG emissions by 36% on average (range: 22% - 62%). With a completely emissions-free grid, emissions are reduced by 97% on average (range: 94% - 98%) with the ZNC Target-reaching packages.

For comparison, the emissions reductions achieved by setting the standards using the EE Target method would allow less decarbonization. Assuming today's electricity supply, the EE Target would reduce the case study buildings emissions by 26% on average (range: 0% - 46%). With a completely emissions-free grid, emissions are reduced by 87% (range: 71% - 98%).

Two observations when comparing the impact of the targets for these case study buildings:

1) Type 4, the newer multifamily building, has an EUI today that is lower than the EE Target, so that building would not need to take any action.
2) For many offices, the EE Target and the ZNC Target are the same because most offices in the county are all-electric already, and the assumption of electrification is the only difference between the two targets.

There are two reasons why a small amount of emissions remains after achieving the ZNC Target. One is that the electricity supply is estimated to still have a small amount of emissions associated with it, which can be offset through renewable energy purchases [8] This is reflected in a non-zero emissions factor for the "100% Renewable Electricity Supply" scenario above.

The second reason is that with a whole building site EUI target, some buildings are capable of meeting the ZNC Target without fully electrifying all fossil fuel end uses. For some buildings, the remaining fossil fuel use could be offset with deeper electricity efficiency to meet the site EUI target.

Disclaimer on Retrofit Capital Costs

While best estimates are used to develop total retrofit costs for measures, each measure is subject to a wide variety of factors within and outside the building. Each cost estimate should be interpreted as a rough estimate that is the result of a high-level review of building conditions and applicable measures. Costs are total equipment and labor costs, not including avoided costs of existing equipment replacements, incentives, or financing agreements which may reduce initial capital costs, all of which are components of developing a net cost of each measure for each building.

[8] Estimate of 3% remaining electricity emissions intensity from conversations with other cities in climate action planning using the CNCA EBPS tool.

SITE ENERGY USE INTENSITY PERFORMANCE TARGETS

The analysis team developed technically achievable whole building site EUI targets that, if met, would help Montgomery County reach its emissions reductions goals for the building sector. The targets and methodology are described in this section and in *Appendix VI – Performance Standard Calculation Inputs* and *Appendix VII - Underlying Assumptions for Target Setting.*

PERFORMANCE STANDARDS CALCULATION

The Montgomery County Stakeholder Recommendation Report[9] has a number of recommendations on how the County should approach a BEPS policy, including the type of metric to use and how to compile the needed information. The report makes a justification for a site EUI target as a way to promote holistic energy efficiency as well as decarbonization of fossil fuel systems. Accordingly, this technical analysis uses site EUI as the performance metric.

This technical analysis aimed to recommend the final year BEPS targets for buildings based on their building types (e.g., office, retail) and energy use patterns in Montgomery County buildings resulting from typical occupant and equipment density. For a given building occupancy group, setting a less aggressive EUI target enables a building to meet the target without significant decarbonization through electrification. Setting more aggressive EUI targets, on the other hand, may compel building owners to electrify, which greatly reduces EUI compared to fossil fuel efficiency measures. There is a technically achievable limit to how low an EUI any given building can be. Setting an EUI target lower than that technically achievable lower limit would result in many buildings being unable to achieve the targets.

The theory of this technical analysis is that there is a site EUI target that is technically achievable for nearly all buildings in an occupancy type that would help the County meet its GHG reduction goals, although it may require deep energy efficiency retrofits and potentially electrification in most buildings.

To identify these site EUI targets, the analysis team relied on the Carbon Neutral Cities Alliance's "Performance Standards for Existing Buildings: Performance Targets and Metrics Final Report"[10]: a methodology and workbook[11] ("CNCA EBPS tool") created to inform technically achievable performance standards across building occupancy types. Steven Winter Associates and Sustainable Energy Partnerships authored this framework in 2020 with participation by expert advisors and government sustainability staff from around the country.[12]

METHODOLOGY

Site EUI building performance standards were created based on technically achievable performance using typical energy use profiles in various building occupancy types and assuming retrofits would be undertaken using commercially available technology. The whole-building energy use targets could be met using a variety of means, but to set the targets, the typical building energy use in each occupancy group was assumed to be reduced through

[9] https://www.montgomerycountymd.gov/DEP/Resources/Files/ReportsandPublications/Energy/MC-BEPS-Stakeholder-Report.pdf
[10] http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Targets-and-Metrics-Memo-Final-March2020.pdf
[11] http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Targets-Workbook-Final.xlsx
[12] Slide 4. http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Project-Summary-Final.pdf

energy efficiency measures and subsequent electrification of fossil fuel end uses. While the targets do not make any assumptions around the addition of on-site solar PV to reduce site EUI, some of the case study building packages (see *Appendix V – Building Cost – Benefit Case Study Details*) did include on-site solar PV to offset some electricity use relatively cost effectively, as the County's BEPS policy may seek to credit on-site solar generation as a potential pathway to make progress towards the target.

Energy use baselines in this technical analysis were based on calendar year 2019 energy use, if available. The proposed BEPS bill would use the two highest years in a three-year baseline period, allowing some flexibility for fluctuations in energy use.

For interim targets, the Stakeholder Recommendation Report suggested the use of a long-range "trajectory model" for interim targets such that each building would need to make steady progress toward a final year target. This technical analysis adopted the use of the trajectory model to set interim targets. See *Appendix IV* – Impact of Trajectory Targets for a discussion of the trajectory model. The rest of this section describes the final year target setting and results.

RECOMMENDED TARGETS TO ACHIEVE COUNTY GOALS OF EMISSIONS REDUCTIONS THROUGH ENERGY EFFICIENCY

Final year targets, which are "the numeric value of site EUI that each covered building must ultimately achieve or exceed" by the final year of the performance standard, were based on the CNCA EBPS tool.

Two final performance standard targets were analyzed in this technical analysis – an Energy Efficiency (EE) target and a Zero Net Carbon-Compatible (ZNC) target. These site EUI targets would be applied to each occupancy type in a building. Buildings with multiple occupancy types would have an area-weighted average target using the below targets applied to each occupancy type, with a whole-building target being proportional to the relative areas of the different occupancy types in the building.

- **Energy Efficiency (EE) Target**: assumed all energy end uses were deeply optimized and tuned without assuming occupant behavior changes such as energy conservation, though conservation would also work toward this target. This target-setting method assumed that typical buildings could maintain the use of fossil-fuel burning systems for typical end uses such as space and water heating but would eliminate inefficiencies of those systems.
- **Zero Net Carbon-Compatible (ZNC) Target**: an EUI level simulating the electrification of all fossil fuel end uses using market-ready technology in an energy efficient building. This target was intended to be compatible with Zero Net Carbon goals because it implicitly required the elimination of most on-site fuel burning.
- **Mid-point between EE and ZNC Targets:** This target type exemplifies how the site EUI targets can be chosen anywhere along this spectrum between the EE and ZNC targets. A mid-point target was calculated to identify the impact of splitting the difference between the two targets. This target could be achieved using a combination of energy efficiency measures and partial electrification, or electrification of some, but not all, fossil-fuel driven systems.

The EE and ZNC targets came from the CNCA Existing Building Performance Standards tool. One is energy efficiency (EE) based, which assumes the median EUI building can reduce energy use through efforts such as existing system optimization, high-efficiency water fixtures and conservation, efficient appliances, and retro-commissioning where appropriate. Numerous

studies suggest economically feasible reductions of 10-30%[13,14,15] with an upper limit to reductions in typical buildings of 30%. The US Department of Energy (DOE) Advanced Energy Retrofit Guides list numerous measures and retrofit packages for several commercial building types without considering electrification. See *Appendix X – Literature Review of Deep Retrofit Savings* for more detail on specific measures across a few building types.

The ZNC target assumed on-site fuel burning is eliminated through electrification, further reducing site EUI based on standard assumptions in the CNCA EBPS tool. This Zero Net Carbon-Compatible (ZNC) target can be thought of as a technically feasible limit on building energy performance for each group.

Neither target explicitly assumed the addition of (a) wall insulation to the exterior of the building, (b) high performance window installations, or (c) energy recovery ventilation systems because of the limited applicability of the measures across all building types. However, these measures can greatly improve the performance of buildings and make further decarbonization possible by reducing heating and cooling loads, thereby decreasing the necessary capacity of electric heating and cooling systems. These retrofits could be implemented by any individual building in pursuit of achieving a site EUI target, but the target-setting calculations themselves do not assume the implementation of these retrofits.

The targets were calculated using the 2019 Montgomery County benchmarking data and other sources[16]. The 2019 Median Site EUI for each building type served as the baseline energy use from which the targets were calculated. The resulting targets are shown graphically in Figure 1 and numerically in Table 9. Note that the site EUI targets would be for the whole building site EUI, with no restriction on specific energy sources (e.g., electricity, natural gas) used in a building.

These targets show what is, by the theory of this technical analysis, technically achievable for buildings in each building occupancy type. The largest percentage savings required to reach the targets was in multifamily buildings, particularly older multifamily buildings, which typically have central heating and hot water systems heated by burning fossil fuels. These systems have the most potential for site EUI reduction because the heat pump systems that can replace them are efficient in comparison[17].

Occupancy types with minimal gas use in the 2019 Median column have relatively smaller reductions to reach both the EE and ZNC targets. Within a site EUI framework, all-electric buildings are typically more efficient because electricity-driven systems have fewer opportunities for energy waste, and that waste is expensive because electricity is a relatively expensive commodity compared to natural gas.

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[13] NYC Buildings Technical Working Group. See Rudin Management case study, page 71, among others: https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport_04212016.pdf
[14] https://www.aceee.org/sites/default/files/publications/researchreports/a1402.pdf
[15] DOE Advanced Energy Retrofit Guides (AERGs) for various commercial building types, also detailed in Appendix III: https://www.energy.gov/eere/buildings/advanced-energy-retrofit-guides
[16] See *Estimating the Baseline for Groups with Insufficient Energy Information* for details.
[17] Hopkins, Takahashi, Glick, Whited. "Decarbonization of Heating Energy Use in California Buildings". October 2018. Synapse Energy Economics, Inc. Page 10 says "*Because a heat pump moves heat rather than generating it, the efficiency of heat pumps can be over 100 percent… for heating season, heat pumps could typically have a COP exceeding 3, meaning a heat output 300 percent of the energy input.*" This 300% efficiency is much more efficient than the <95% efficient gas equipment that a heat pump would replace.

Table 9. Site EUI target options for each building group. The EE standard would require less retrofit work in buildings. Multifamily can be combined to one group (see Multifamily Buildings) with the same standard of 35-55 kBTU/SF as the potential site EUI across the three targets was similar, even though they started at different site EUI levels. This table is sorted by "Current Energy [Billion BTU]".

	2019 Median			EE Target			ZNC - Target				
Performance Standards by Building Type [Site kBTU/SF]	Gas EUI	Elec EUI	**Site EUI**	Gas EUI	Elec EUI	**Site EUI**	Gas EUI	Elec EUI	**Site EUI**	Est Parcel Count	Current Energy [Billion BTU]
Multifamily	38	24	**62**	33	20	**55**	0	35	**35**	336	4,698
Office	0	62	**63**	0	53	**53**	0	53	**53**	391	4,631
Other	56	180	**235**	45	153	**198**	0	167	**167**	76	1,792
Health care Inpatient	188	117	**305**	169	99	**268**	0	187	**187**	10	1,752
Mercantile Enclosed and strip malls	47	64	**111**	43	54	**97**	0	77	**77**	45	1,204
Food sales	72	130	**202**	65	110	**176**	0	143	**143**	55	996
Lodging	38	49	**87**	34	41	**76**	0	58	**58**	73	821
Public assembly	48	49	**96**	42	41	**83**	0	61	**61**	53	335
Mercantile Retail (other than mall)	16	46	**62**	14	39	**53**	0	45	**45**	82	322
Health care Outpatient	0	73	**73**	0	62	**62**	0	62	**62**	38	242
Education - K-12 School	25	30	**55**	21	26	**47**	0	36	**36**	40	183
Warehouse and storage	0	19	**19**	0	16	**16**	0	16	**16**	144	180
Religious worship	24	34	**57**	20	29	**49**	0	37	**37**	71	98
Education	69	34	**104**	61	29	**90**	0	58	**58**	3	39
Public order and safety	40	45	**86**	35	39	**74**	0	52	**52**	11	34
Food service	180	91	**271**	172	78	**250**	0	171	**171**	1	0
Service	36	26	**62**	30	22	**53**	0	33	**33**	1	0
Vacant	0	0	**0**	0	0	**0**	0	0	**0**	0	0

Approach to Technically Feasible Limits to Inform Targets

A description of the approach for each target is shown below as an extended excerpt of the CNCA report[18]. A longer description of the impact on various end uses is included in *Appendix VII - Underlying Assumptions for Target Setting*. This summarizes the approach to target setting, but it does not dictate a specific retrofit package for a particular building. Any individual building would develop a scope of work that reflects how it would achieve or exceed its respective target. The target setting methodology, however, approximates what the typical building of a given occupancy type can achieve using assumptions on existing systems and their efficiency, both current and what is technically achievable.

[18] Supra 10, taken from page 14.

Energy Efficiency Performance Standard - Assumptions and Incremental Upgrades

To enable carbon neutrality in the long term, energy efficiency improvements are needed and can be promoted through interim target setting while not specifically requiring electrification. The results of the following retrofits indicate the Energy Efficiency (EE) target:

1. *Energy efficiency improvements to all electricity using end uses. In a carbon-neutral grid scenario, this measure reduces electricity loads and constraints on the grid when gas end uses are electrified.*
2. *Basic air sealing and enhanced thermal efficiency of most commonly replaceable envelope elements (i.e., windows, roofs), typically at end of life.*
3. *Energy efficiency of gas-based space heating systems – better heating controls, high-efficiency water fixtures. [This does not include installation of more efficient gas equipment.]*
4. *Potential efficient electrification of domestic hot water or space heating would not be required but could be done as a way to meet the target.*
5. *Potential efficient electrification of cooking, laundry, and other gas process loads would not be required but could be done as a way to meet the target.*
6. *Some potential increase in the use of space cooling in accordance with social trends around supplying cooling as either an amenity or an adaptation strategy for heat wave safety in residential buildings.*

Zero Net Carbon – Compatible Performance Target – Path Assumptions and Incremental Upgrades

To achieve carbon neutrality, the ZNC performance standards assumes the electrification of all gas end uses. The electrification of end uses assumes that those end uses are optimized through the energy efficiency assumptions laid out in the Energy Efficiency target. While the order may not always be sequential, the technical potential of buildings would be realized by optimizing end uses, especially space heating and cooling uses and electrifying beyond those uses. Alternatively, it may be easier for some buildings, such as those with difficult-to-optimize heating systems (i.e., central steam plants) to electrify immediately and undertake the energy efficiency measures in parallel. Energy efficiency of heating and cooling may be achieved with the act of modernizing the system, enabling better control and heat delivery, instead of undertaking the often-challenging task of optimizing the existing heating systems.

The resulting modeled reductions in site EUI for the EE and ZNC targets are shown in Table 10 and Figure 7. The EE reductions use the occupancy type median as the baseline, and the ZNC reductions use the EE target as the baseline. For example, if gas water heating was 10 kBTU/SF for the occupancy type median, the EE target would use 9 kBTU/SF and the ZNC target would use 3.7 kBTU/SF. The ZNC target would also have this 3.7 kBTU/SF be electricity, not gas.

Using the above methodology, each building type has EE and ZNC targets created, summarized graphically using an example in Figure 7.

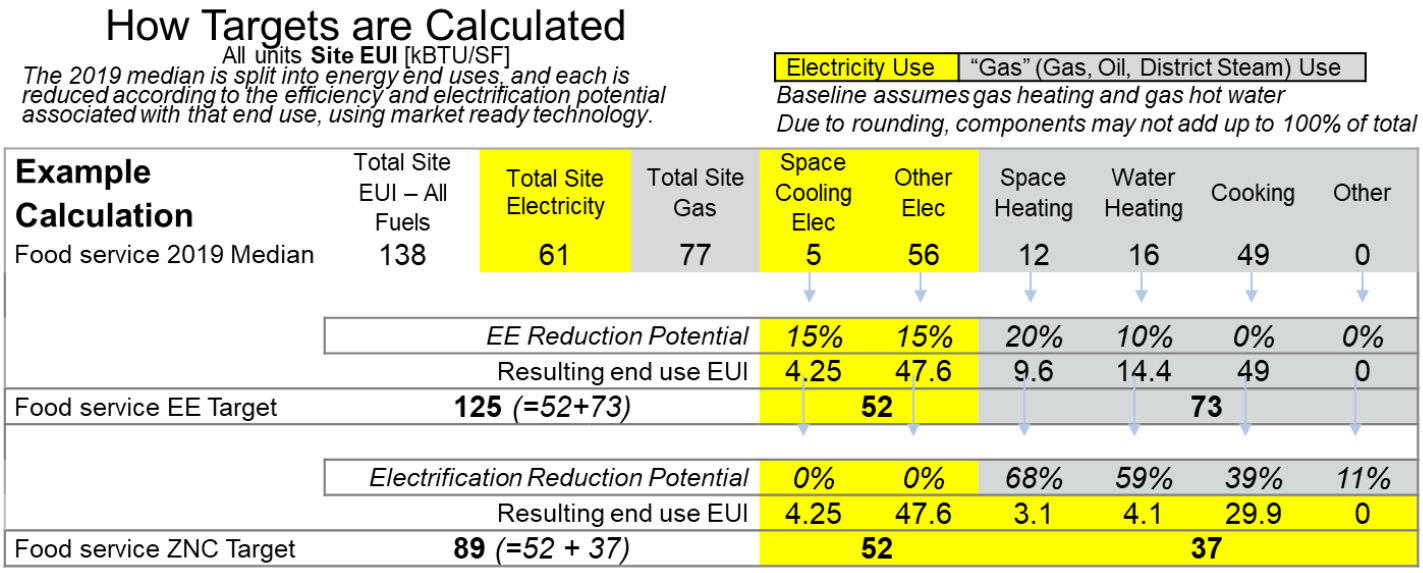

Figure 7. Target calculation, from baseline data through splitting up energy end uses and applying reductions to each end use to arrive at the Energy Efficiency (EE) and Zero Net Carbon-Compatible (ZNC) targets.

Table 10. Reductions in Site EUI for end uses, taken from CNCA EBPS tool.

End Use	Percent reduction from the median for EE target	Percent reduction starting from the EE target for ZNC target
Electricity	15%	0% (no further change)
Gas Space Heating	20%	68%, all electric (COP* 0.80 → 2.50)
Gas Water Heating	10%	59%, all electric (COP 0.90 → 2.20)
Gas Cooking	0%	39%, all electric (COP 0.45 → 0.74)
Gas Laundry/Other	0%	11%, all electric (COP 0.90 → 1.00)

**COP is the Coefficient of Performance of the equipment, defined as energy output (heat) divided by purchased energy input (gas or electricity). A COP of 0.8 is an annual efficiency of 80%. A heat pump can operate at average efficiencies of 250% (COP of 2.50) by extracting heat from the outside air. Efficiency assumptions came from the 'Electrification of Gas End Uses' tab of the CNCA EBPS tool.*

Estimating the Baseline for Groups with Insufficient Energy Information

As described in earlier sections of this report, this technical analysis uses 2019 Montgomery County building energy benchmarking data as the most recent and comprehensive set of local data on individual buildings. The benchmarking data are used to set the baseline EUIs, but several building types that could be covered by a BEPS are underrepresented in the 2019 benchmarking data. This technical analysis identified three main sectors of the building stock this applies to and describes how this technical analysis accommodated these buildings to create site EUI targets.

Cause: Multifamily residential building types are not currently covered by the benchmarking program.

Considerations: Multifamily building energy use is highly driven by local climate and locally common mechanical systems, and therefore using a local estimate is preferred over a national or even a regional estimate.

Solution for this technical analysis: Montgomery County borders Washington D.C., which has been collecting benchmarking information on multifamily buildings for multiple years. The Washington D.C. benchmarking data from 2019 was thus analyzed using the same cleaning and organizing methodology as the Montgomery County data. The building type was split into three subgroups (MF-New-Tall, MF-Old-Tall, and MF-Short, see *Multifamily* in *Appendix II* - Montgomery County Energy Use Distributions Overview for definitions) and the energy distributions for those types were calculated. Specifically, the average electricity energy use intensity (EUI) and gas EUI were calculated for every decile of site EUI, as shown in Figure 8:

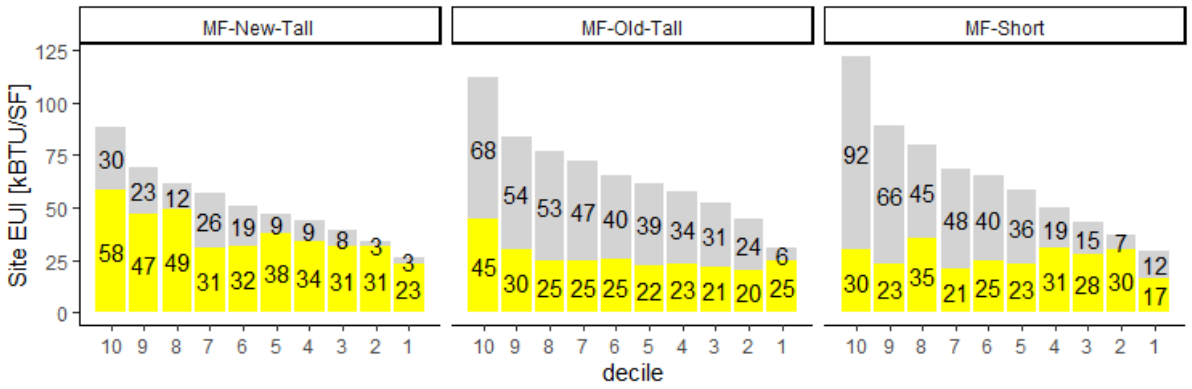

Figure 8. Deciles of energy use intensity from DC Multifamily buildings.

These distributions were mapped to the Montgomery County multifamily buildings identified as the potential covered buildings list, assuming the same energy distributions of each subgroup across the two locations. Each Montgomery County building was assigned an electricity and gas EUI based on its subgroup. For detail on this mapping, see *Appendix III - BEPS Policy Model Methodology.* The potential energy standards were calculated for the multifamily building population using the energy use data from the Washington D.C. multifamily building population.

The deepest technical potential site EUI across the three targets was similar, as shown in Table 11, even though they started at different site EUI levels. To facilitate consistent enforcement, site EUI targets can be set for the whole population instead of distinct targets for each multifamily subgroup and was done in this technical analysis. The highest target of each subgroup was used so that technical feasibility was not exceeded for any one subgroup. The results are shown in Table 11, indicating that the EE site EUI target used for the technical analysis came from the MF-Old-Tall potential, which had the highest site EUI for that target, and the ZNC target came from the MF-New-Tall potential, which had the highest site EUI for that target.

Table 11. Comparison of multifamily median and subgroup targets, using DC data processed with the CNCA EBPS tool, as shown in site EUI.

Median in kBTU/SF	MF-Short	MF-Old-Tall	MF-New-Tall	MF-All highest of the three
Median EUI	62	**64**	48	**64**

Targets in kBTU/SF	MF-Short	MF-Old-Tall	MF-New-Tall	MF-All highest of the three for each target
EE Target	54	**55**	42	**55**
ZNC Target	34	33	**35**	**35**

MF-Old-Tall buildings, which have more fuel-based and more centralized systems, have the highest median site EUI and will have the highest site EUI reductions through efficiency measures alone, since some inherent structural inefficiencies in older fuel-based systems are limited in energy efficiency potential, while newer buildings have more insulation and more efficient systems in general. Short buildings are similar in EUI potential to MF-Old-Tall but slightly lower.

It also makes sense that MF-New-Tall has the highest potential ZNC target EUI because there are generally more electricity-using systems in these buildings today, meaning electricity use can't be reduced as low as in buildings with less electricity-using equipment. In addition, newer buildings tend to have more amenity spaces and interior common area electricity use. While older buildings with fewer amenity spaces and common area electricity use may technically be able to reach slightly lower EUIs, the newer buildings--which often have the potential to be healthier buildings with better services— provide the value for a technically achievable ZNC target for the multifamily occupancy type as a whole.

Commercial and Industrial building types that are not well-represented in the existing Benchmarking data (few samples, or often less than 25,000 SF or Part of Other Buildings)

Cause: There are some examples of covered building types that are typically smaller than 50,000 SF (the 2019 size threshold for private building benchmarking). This primarily applies to small businesses located in shopping malls or as part of a larger single building, where energy use is aggregated with other building types. There are also buildings that are too few in number to generate a confident local area median of the energy use profile. The following building types had fewer than ten benchmarking reports[19]:

Table 12. Building use types with very few instances of the use type as the primary building activity, as represented in the 2019 Montgomery County benchmarking data.

Occupancy type	Example use types	Submissions with data available	Submissions post data screening
Food Service (Restaurants)	Restaurants, fast food, bar, café, etc.	3	1
Service	Salon, mailing center, repair shop, etc.	3	1
Public order and safety	Courthouse, firehouse, police station, etc.	4	2

Considerations: While there are many of these buildings in Montgomery County, the vast majority do not file benchmarking data because they are less than the current square footage size threshold of 50,000 SF and are

[19] Post data screening, see Explanation of Cleaning Flags. Note that hospitals also had less than ten examples (four), but these were discussed among the team and believed to be fairly representative of the hospitals in Montgomery County, so those four samples were used as the baseline to generate performance standards.

metered independently, with independent energy systems which classify them as separate buildings. These types may also be smaller than the proposed BEPS size threshold but make up portions of larger buildings in the form of ground floor retail. These occupancy types need to have targets assigned because the performance target for a given building is based on the area-weighted average of the different space targets in the building.

Solution for this technical analysis: Calculate a BEPS target based on the occupancy type average in the Commercial Building Energy Consumption Survey (CBECS) data set using the CNCA EBPS tools[20], with extrapolation to the local Building America Climate Zone as used in the 2012 CBECS data set[21] to adjust estimated heating and cooling energy use. Table 9 has the target values for these occupancy types.

Campuses

Cause: Campuses have multiple buildings located near each other and may be closely intertwined with energy systems, energy meters, or other characteristics. The proposed BEPS policy is written to define each building as an independently regulated entity, which can be problematic on some campuses where it is difficult to differentiate energy use for individual buildings with shared systems. Campus buildings will have an easier time filing for compliance if the single owner can submit energy information for the campus, which will include multiple buildings, each potentially having a different occupancy type and therefore different target.

Considerations: Each campus in Montgomery County will be somewhat unique in terms of energy systems layout, energy metering configurations, and other connections between buildings that may not have a physical or structural connection. The definition of covered buildings and the method for determining performance standards needs to respect these unique features to be a fair and inclusive performance requirement.

Solution for this technical analysis: As much as possible, final year targets should be calculated as an area-weighted average of different building occupancy types for a single benchmarking submission. While for most buildings, this will be applied to a single building with multiple occupancy types (e.g., ground floor retail in an office building), the approach can also be used for multiple buildings on a single campus where buildings share energy systems, meters, or are otherwise reported in a single benchmarking submission.

The definition of a building still applies in this case, but multiple buildings would be included in a single benchmarking submission. Therefore, each building, as an independent structure, would need to align with the covered building definition in other ways. Specifically, under the definition of a covered building in the proposed BEPS policy[22], each building on a campus would need to be:

> *(1) any single structure utilized or intended for supporting or sheltering any occupancy, except if a single structure contains two or more individually metered units operating independently that have stand-alone heating, cooling, hot water, and other mechanical systems, and no shared interior common areas, or;*
>
> *(2) two or more structures utilized or intended for supporting or sheltering any occupancy, that:*
>
> *(A) are serviced by a common energy meter,*
>
> *(B) have a common heating or cooling system,*
>
> *(C) share interior common areas, or*

[20] Energy Performance Standards for Existing Buildings. Carbon Neutral Cities Alliance. https://carbonneutralcities.org/tile/energy-performance-standards-for-existing-buildings/

[21] Montgomery County is in the Building America Climate Region “Mixed-Humid”, according to the Building America Best Practices Series Volume 7.3: High Performance Home Technologies: Guide to Determining Climate Regions by County. Prepared by Pacific Northwest National Laboratory, August 2015. Page 20. https://www.energy.gov/sites/default/files/2015/10/f27/ba_climate_region_guide_7.3.pdf. Accessed July 7th 2021.

[22] Montgomery County. Bill 16-21 - Environmental Sustainability - Building Energy Use Benchmarking and Performance Standards - Amendments: https://apps.montgomerycountymd.gov/CCLLIMS/BillDetailsPage?RecordId=2707 Page 3. Proposed legislation packet.

(D) whose configuration otherwise prevents an accurate determination of the energy consumption attributable to each individual structure.

Buildings on a campus that are individually smaller than the size threshold may still be included in the campus submission if any of the above coverage conditions are present for the small building. The intent with this definition is to make the coverage requirements easier on the owners by including buildings where the energy use would be hard to separate from other covered buildings.

The following are some examples of campus layouts, which roughly align with EPA's Portfolio Manager guidance[23] and how the proposed building performance requirements would apply. Potential campus submissions would need to identify which buildings are connected and how (meters and/or systems).

[23] Portfolio Manager FAQs > Property Information > Campuses: "How do I benchmark a campus?" https://energystar-mesa.force.com/PortfolioManager/s/article/How-do-I-benchmark-a-campus-1600088534782 Accessed 5/27/2021.

Table 13. Potential campus-like scenarios and the respective performance standards calculation method.

Case 1: Multiple buildings of different use types, all subject to the same standards deadlines			
Campus Type	*Energy Meters*	*Energy systems*	*Standards Calculation*
1a	Each building has a utility meter for all energy use	Energy systems are not shared between buildings	Each building would submit documentation separately, and each has a separate performance standard based on use type. There may be an option for buildings to submit a single submission for the campus. The target setting process would treat the campus as one building and set standards accordingly.
1b	Each building has a utility meter for electricity energy use	A shared hot water or other thermal system is used between buildings with a central plant	All buildings on the shared energy system would submit documentation together with a total electricity and thermal energy use. The campus would get one performance standard that is an area-weighted average of all the building types and floor areas.
1c	Energy meters are for multiple buildings on the campus	Energy systems are not shared between buildings	All buildings on the shared energy meters would submit documentation together with a total electricity and thermal energy use. The group of buildings would get one performance standard that is an area-weighted average of all the building types and floor areas.
Case 2: Multiple buildings with some smaller than the size threshold (e.g., 25,000 SF) or with mixed compliance deadlines (buildings span multiple "Groups")			
2a	Each building has a utility meter for all energy use	Energy systems are not shared between buildings	Each building would submit documentation separately, and each has a separate performance standard based on use type. Buildings would comply according to their respective Group's timeline. Buildings smaller than the size threshold or an exempt property type would not need to comply.
2b	Each building has a utility meter for electricity energy use	A shared hot water or other thermal system is used between buildings with a central plant	Same as (1b), with the entire campus submitting compliance paperwork with the earliest deadline based on individual building type's Group. Another compliance method could be to align compliance with the date for the central plant's building.
2c	Energy meters are for multiple buildings on the campus	Energy systems are not shared between buildings	Same as (1c), with the entire campus submitting compliance paperwork with the earliest deadline based on individual building type's Group.

Changes to Campus Benchmarking Submission Process Based on the Updated Definition

The current benchmarking process allows a compiled submission for campus owners, regardless of whether the buildings would be classified as individual or not under the proposed BEPS standard. These campuses may need to change how building information is submitted to comply with the current definition. There may also be a case where significant work to a campus results in different metering or energy systems configurations, which could change how the campus buildings are defined and reported. If this occurs after the

initial energy monitoring period, some adjustment to energy use standards will need to occur. These properties may need to develop a new energy baseline after the campus reconfiguration is complete and would fall into the compliance cycle timing assigned to the new occupancy type and campus type.

Comparison to Other Building Performance Standard Campus Methods

Washington, D.C.: In Washington DC, the Department of Energy & Environment (DOEE) oversees the Building Energy Performance Standards and energy benchmarking. DOEE used a similar area-weighted average method to develop unique standards for several colleges and universities.[24] The area-weighted Site EUI metric works for campuses in Montgomery County in a similar way to the area-weighted Source EUI metric calculation in the DC BEPS. In DC, DOEE and the BEPS Task Force discussed this method with campus owners for feedback and approval to get a solution that works for most. The Montgomery County standard calculation can use the same method, where each space type (e.g., office, dorm, laboratory) would get an EUI target, and that would be multiplied by the floor area proportion that the respective space type makes up of the whole campus.

St. Louis, MO: In St. Louis, the primary property type calculated for each submission is used to define site EUI targets. A single submission receives a single target based on the primary property use type, without a blending of targets for mixed-use spaces or campuses.[25]

New York City, NY: In New York City, the building emissions law is based on covered tax parcels ("lots"). Coverage is defined as[26]:

(i) a building that exceeds 25,000 gross square feet (2322.5 m^2) or
(ii) two or more buildings on the same tax lot that together exceed 50,000 gross square feet (4645m^2), or
(iii) two or more buildings held in the condominium form of ownership that are governed by the same board of managers and that together exceed 50,000 gross square feet (4645m^2)

The definition would pull in many campus layout buildings, which are often on a shared parcel. Note that definition (iii) would also bring in multiple-building condominiums if under the same board management, since condominiums would have multiple tax parcels across a potential campus system. The performance standard in the New York City law is an area-weighted energy-based GHG emissions limit with a specific GHG intensity limit ($kgCO_2e$/SF/yr) for each building type based on building code occupancy groups.[27] The New York City law does not differentiate coverage by shared equipment or metering configurations.

Boston, MA: Boston has a similar building definition to New York City and can include a multiple building campus held by the same owner and on the same parcel as a single submission[28], with an area-weighted performance target. [29]

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[24] DC DOEE. "Guide to the DC BEPS". Version 1.0, 3-30-2021. Sections 4.2 and Appendix C. Accessed 5/10/2021. https://doee.dc.gov/node/1507996
[25] St. Louis Building Energy Improvement Board. "Method for Grouping Property Types". Accessed 7/19/2021. https://www.stlouis-mo.gov/government/departments/public-safety/building/building-energy-improvement-board/documents/upload/Method-for-Grouping-Property-Types-05-03-21.pdf
[26] NYC 2014 Construction Codes – Building Code, Chapter 3, §28.320.1: "Definitions, **Covered Building" Accessed 5/17/2021. https://www1.nyc.gov/assets/buildings/apps/pdf_viewer/viewer.html?file=2014CC_AC_Chapter3_Maintenance_of_Buildings.pdf&section=conscode_2014
[27] NYC 2014 Construction Codes – Building Code, Chapter 3, §28.320.3: "Building Emissions Limits".
[28] City of Boston. "Building Emissions Reduction and Disclosure Ordinance." Section 7.2.2 – Definition of non-Residential Buildings and Residential Buildings. https://www.boston.gov/sites/default/files/file/2021/10/BERDO.pdf page 4-5.
[29] Supra 28, Section 7.2.2.i.i, page 11.

Washington State: Building use types are entered into ENERGY STAR® Portfolio Manager, and "buildings with multiple unique building activity types may develop an area weighted EUIt (Energy Use Intensity target)"[30] and otherwise follows Portfolio Manager guidance on building submissions. Campuses can be accounted for with an area weighted EUI target.

Site EUI Target Adjustment Factors

The proposed approach accounts for changes in occupancy type, while occupancy rate is proposed to be left out due to a general lack of reliable data.

Occupancy Type Changes After the Baseline Period

The use of a building may change over time. For example, a hotel in 2019 may become a multifamily apartment building in 2030, and a retail space in 2021 may become a grocery store in 2025. Newly constructed buildings would need interim and final year targets. These changes in all or part of a building's intended occupancy use can substantially change the energy use profile and its respective performance standard. The building energy performance standard framework should adjust for these major building use type changes over time.

Proposed Approach

The following three steps can be taken to update a building's targets based on changes in occupancy type:

1. If occupancy group proportions change, then final year target is adjusted to reflect the new proportions. The calculation methodology is the same as for the original target, but with the updated occupancy types.
2. Intermediate performance targets have an adjusted target EUI. Interim deadlines do not change. A new straight line is created from updated EUI (with new occupancy proportions) to the final year target.
    a. For example, an interim target for an office building is 60 kBTU/SF in 2026, and that building changes to a retail store in 2023, with a new calculated interim target of 65 kBTU/SF. That new interim target would still be in 2026, since offices and retail types have the same interim and final year target deadlines. See Figure 6 below for visual examples.
3. Data verification of occupancy type changes can happen at the time of the occupancy type update. This allows for an effective immediate adjustment to the target of a specific building. Otherwise, the occupancy type change would happen at the next scheduled data verification period, which is every three years in the current Benchmarking Law.

Process For Recalculating Targets Based on Occupancy Type Changes

- **New final year target:** The applicable final year target for new occupancy groups or a new blend of occupancy groups where there is more than one group would use the same methodology as the calculation of the original final year target as described in this technical analysis.
- **New interim targets:** Because the interim targets consider the initial EUI of a building in the baseline year/period, the new interim targets need to consider the year of the change in occupancy. This is a possible calculation method to use:

$$New\ Interim\ Target\ EUI$$

$$= Final\ Target\ EUI + \frac{Final\ Target\ Year - Interim\ Target\ Year}{Final\ Target\ Year - Current\ Year} * (Current\ EUI - Final\ Target\ EUI)$$

[30] Washington State Department of Commerce. "How to Determine Energy Use Intensity Target (EUIt)". Accessed 10/18/2021. https://www.commerce.wa.gov/wp-content/uploads/2021/07/How-to-Determine-EUIt.pdf

Figure 6 at right shows a few examples of how targets can be recalculated for changes in occupancy type.

In 6a, a building in Group 1 starts as a mixed-use Office/Health care Outpatient building and remains so throughout the BEPS period. This building's targets are set as a blend of the two occupancy types and do not change.

In 6b, a building that is 100% Health care Outpatient at the beginning of the BEPS period converts part of the building to be Office in 2024. A new baseline is set in 2024, and the interim and final year target are updated to reflect the new occupancy types – for the final year target – and a new straight line is drawn between the new 2024 baseline to get the new interim targets. Note that the dates of the interim targets do not change.

In 6c, the same scenario happens as in the second example but after the first interim period. In this case, the final year target is recalculated for the final year, and only the second interim target is updated to be on the straight line between the 2028 baseline and the final year target.

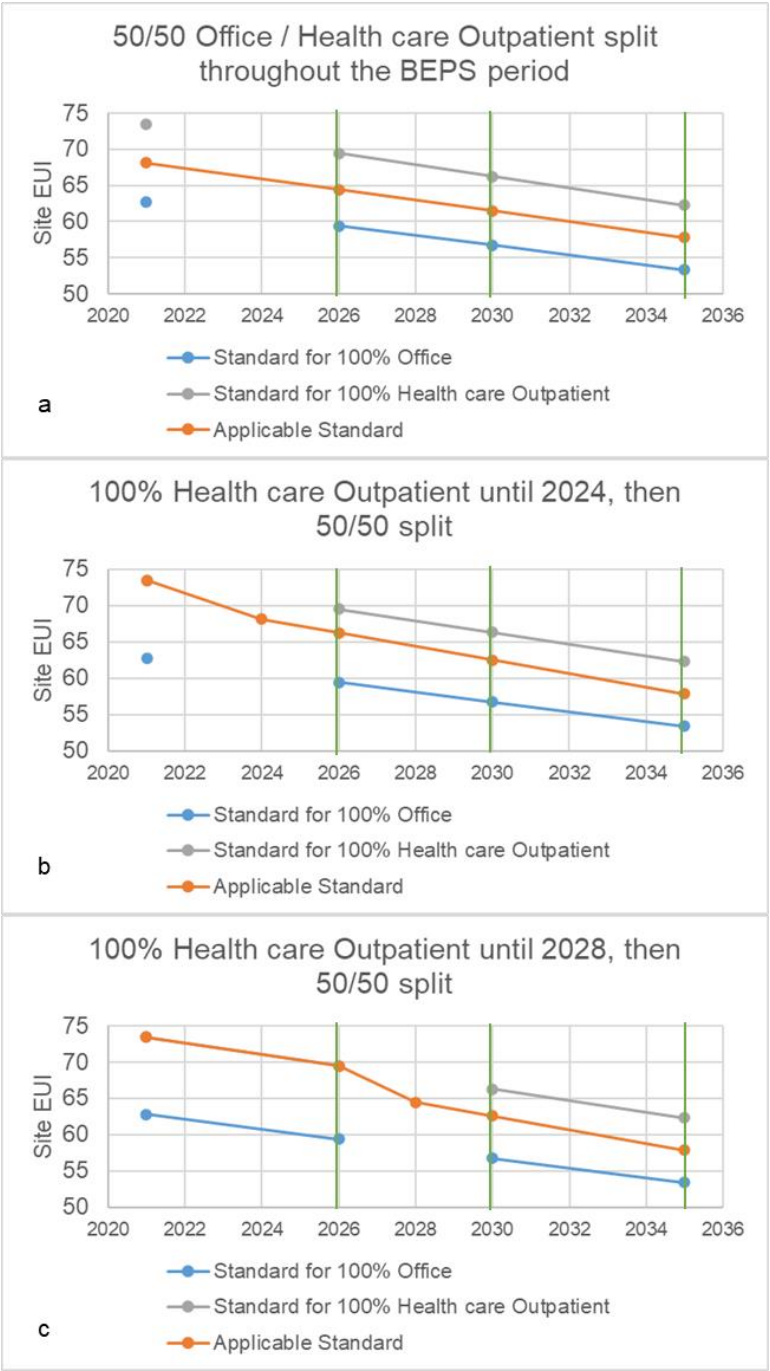

Figure 9. Examples of how a change in occupancy type during the interim period would result in updated interim and final targets. Assumption is that the building starts at the median EUI for its use type and meets each target on time, without exceeding the required performance.

Occupancy Rate Changes

Potential Issue

Some buildings may have an atypical amount of occupancy during their baseline years. The portion of a building that is occupied can play a role in how much energy that building uses. If a building's occupancy rate changes over time, the energy use of the building may substantially increase or decrease.

The energy used by systems and services in a building are dependent on occupants in both the short term (daily occupancy) and long term (leasing status). Lighting, ventilation fans, and heating / cooling equipment can be dependent on daily or hourly fluctuations in occupancy. The leasing status of a building defines long-term occupancy, which affects heating/cooling/ventilation equipment, appliances, and computer infrastructure energy use.

There is limited guidance in Portfolio Manager on defining occupancy rate, but not for all occupancy types, and the occupancy rate does not result in an adjustment of the occupancy type's ENERGY STAR Score. As a result, it was difficult to understand the role that such a broadly defined word as "occupancy" should play in the setting of energy performance standards.

Portfolio Manager's Glossary[31]:

> *Occupancy is the percentage of your property's Gross Floor Area (GFA) that is occupied and operational. This is a measure of the building's occupancy/use, it is not connected to a building's "Maximum Occupancy."*
>
> *… If you are not seeking certification for one of the above property types, you may not find Occupancy very useful (though it is required, so enter your best guess and move on)*
>
> *… There is only one Occupancy rate for each property as a whole. You enter Occupancy when you first create the property, and you can change it on the Details tab. You cannot track occupancy changes over time.*

Treatment of the Occupancy Field in this Technical Analysis

- Currently there is not a reliable way to finely adjust targets, baseline, or performance based on occupancy.
- As a result, this technical analysis' target setting methodology did not incorporate occupancy rate as an adjustment factor or as a filter.
- One possible refinement could be to use the same thresholds as Portfolio Manager to not define targets for buildings that are below a certain occupancy rate. For example, for Offices the minimum occupancy rate is 55% to receive an ENERGY STAR score. This approach is not currently integrated into the technical analysis's target setting, but because the baseline energy use from which targets are calculated centers on the median EUI, the few low-occupancy buildings in some groups will not affect the baseline and target values.
- In other jurisdictions, occupancy rate is mostly ignored in setting and enforcing targets and baselines. While many details need to be worked out in rule-making across the country, Washington DC, New York City, and St. Louis all do not have mechanisms for fine adjustment based on occupancy rate. This is likely because there is not a widespread and reliable way to track occupancy rate in buildings.

Recommendations for Adjustments based on Occupancy

- Final year targets were based on the median EUI of the group, including all buildings regardless of occupancy rate. This approach intuitively gives building owners the benefit of the assumption of a typically occupied building in a given occupancy group.

[31] Entry for "Occupancy": https://portfoliomanager.energystar.gov/pm/glossary Accessed June 22nd 2021.

- Interim targets might need to be adjusted if previously vacant space is filled and the building's EUI increases significantly, but it may require a more nuanced approach than this technical analysis's data set can support.
- The proposed policy sets baseline energy use according to the two highest energy use years of a three-year period, which should smooth out some short-term low occupancy periods in a building's operation.
- As a longer-term next step, the County can determine the feasibility of adding more granular and more reliable vacancy inputs to each building space so they can be used as an adjustment factor. This may require coordination with the EPA to develop granular occupancy outputs that can be used to develop adjustment factors, especially to ensure consistency, transparency, and accuracy of record tracking within the Portfolio Manager platforms. This next step is not in progress as of this report writing.

IMPACT OF ENERGY PERFORMANCE STANDARDS IN MONTGOMERY COUNTY

To estimate the impact of the building energy performance standards, the analysis team developed a model Excel workbook that applied the performance standards to a draft covered buildings list. The analysis team then calculated the cumulative impact of the potential standards on energy use, energy cost, retrofit capital cost, and greenhouse gas (GHG) emissions.

The proposed BEPS policy uses building groups with different compliance deadlines. These groups were adopted for the modeling portion of the technical analysis and referenced within as 'BEPS Groups':

Table 14. Montgomery County BEPS groups used in the proposed BEPS policy, and the year when compliance is monitored (reporting is due in the next calendar year):

	Type and Size	Interim 1	Interim 2	Final
Group 1	Non-Residential greater than 250,000 Gross Square Feet (SF)	2026	2030	2035
Group 2	Non-Residential 50,000 – 250,000 SF	2026	2030	2035
Group 3	Non-Residential 25,000 – 50,000 SF	2028	2032	2036
Group 4	Multifamily greater than 250,000 SF	2028	2032	2036
Group 5	Multifamily 25,000 – 250,000 SF	2029	2033	2037

CREATING THE POTENTIAL COVERED BUILDINGS LIST

Using a combination of Maryland State Department of Assessments and Taxation (SDAT) property records and geographic information system (GIS) data[32], the floor area and covered buildings were identified using the size thresholds and buildings definition in the proposed BEPS policy. See *Appendix III - BEPS Policy Model Methodology* for details.

Determining Multifamily Specific Attributes for Impact Modeling

Multifamily buildings were separated into three sub-groups depending on height and age (MF-New-Tall, MF-Old-Tall, MF-Short) as described for target setting, using data fields in the SDAT data set to make the subgroup determination.

There are likely many MF-Short buildings that would not be covered based on the definition of a covered building regarding shared spaces, interior common areas, single building size vs parcel size. To account for this, the technical analysis's impact modeling used an assumption that the smaller 50% of garden style MF-Short buildings would be exempt from coverage.

Determining Commercial Buildings Coverage and Exemptions

For commercial building types, the various exemptions and building definitions rules were applied to buildings with floor area over 25,000 SF:

- Parcel matchup from benchmarking data to SDAT using the US Department of Energy's Standard Energy Efficiency Data (SEED) matchup provided by MC DEP.
- If the building did not submit benchmarking data, the Land Use Code was used to determine the occupancy type.
- Exempt use types were filtered out by Land Use Code.
- State and federal government owned buildings were removed by filtering for parcel owner name.
- County buildings were flagged using parcel owner name.

[32] Compiled and provided by MC DEP for this technical analysis

- Montgomery County Public School (MCPS) and Montgomery Community College (MCC), which are state regulated entities and are not required to report benchmarking data, were removed using parcel owner name.

The results of this parcel coverage analysis for residential and non-residential buildings are shown in Table 15.

Table 15. Estimated covered buildings resulting from the analysis of tax parcel and GIS building data. At left, the "Total Identified" group of columns is all parcels and buildings that fit the high-level parcel size threshold screening. At right, the "Covered: Used in Analysis" group of columns is the remaining properties after screening for individual building size, exempt use types, and exempt ownership types.

	Total Identified			Covered: Used in Analysis		
	Buildings	Parcels	Total Floor Area [Million SF]	Buildings	Parcels	Total Floor Area [Million SF]
MF-New-Tall	333	155	52.1	296	145	49.9
MF-Old-Tall	144	96	29.1	122	90	27.8
MF-Short	156	122	9.9	125	101	9.0
Higher Education	34	9	2.0	7	3	0.4
Education - K-12 School	293	241	30.2	54	40	4.6
Food Sales	110	65	7.3	70	55	6.2
Food Service	3	2	0.06	1	1	0.03
Health care Inpatient	51	13	30.7	22	10	10.1
Health care Outpatient	48	39	3.4	46	38	3.2
Lodging	100	78	10.7	84	73	9.8
Mercantile Enclosed and strip malls	136	59	31.0	67	45	18.0
Mercantile Retail (other than mall)	135	88	10.0	100	82	7.8
Office	548	413	80.3	502	391	76.7
Other	166	103	12.8	94	76	8.9
Public Assembly	106	61	7.6	74	53	5.3
Public order and safety	73	25	5.5	12	11	0.6
Religious Worship	94	80	4.1	75	71	3.7
Service	1	1	0.03	1	1	0.0
Warehouse and storage	292	204	15.1	178	144	9.5
Total	**2,823**	**1,845**	**341.8**	**1,930**	**1,426**	**251.5**

Mapping baseline energy use to non-benchmarked buildings

Buildings with benchmarking data were assigned energy use based on known distribution from benchmarking data. For buildings without energy benchmarking data, the methodology for mapping energy data to buildings without energy data was the same for all building types. The known energy distribution from benchmarking (Montgomery County data for most types; Washington, DC data for multifamily) was split into deciles (10th, 20th, 30th, etc. percentiles). For buildings without energy data in a group, a decile was randomly assigned, and the corresponding EUI was applied to that building. See *Appendix III - BEPS Policy Model Methodology* for more detail. On aggregate, the impact of changing targets for the groups can be estimated this way, even if the energy use for a given non-benchmarked building would not be accurate for that specific building.

APPROXIMATING THE ENERGY REDUCTION PATHS OF COVERED BUILDINGS

For all covered buildings, evaluated on the building level, the following analysis is performed to calculate the impact of the final performance standard:

1. If the building had a lower site EUI than the final performance standard, the energy use did not change (building maintains current energy use through the entire BEPS period).
2. If the building had a higher site EUI than the final performance standard, energy is lowered to the final performance standard by reducing gas use and electricity use through energy efficiency. Once the Energy Efficiency threshold is met through efficiency retrofits, and if the building's target is lower than the EE target for that occupancy type, further energy reductions are made through electrification of gas equipment, while increasing electricity proportionally as a result of the conversion from gas to electric equipment. If electricity needs to be further reduced after gas use is eliminated, it is reduced until the final performance standard is met by the final compliance cycle. Specifically, retrofits happen in this order for each building to meet the two interim targets and the final year target:
    a. If gas EUI was greater than the gas component of the EE threshold, gas use was reduced through efficiency work (without electrification).
    b. If electricity EUI was greater than the electricity component of the EE threshold, electricity used was reduced toward the electricity component of the EE threshold, spread evenly over the three compliance periods (1/3rd of the way each time).
    c. If more reduction was needed, uses were electrified to meet the target.

Baseline energy use was based on calendar year 2019 benchmarking data, the most current year of data available for this technical analysis. From that baseline, each covered building was assumed to meet the interim and final year performance targets by the compliance deadline and maintain that performance until the next deadline.

PERFORMANCE STANDARD IMPACT ANALYSIS RESULTS

BEPS Policy Model Methodology

The impact of various energy performance standards was modeled using an Excel workbook that uses the covered building list and calculates the energy, energy cost, capital cost, and GHG changes of the proposed standards.

For a list of assumptions and model inputs, see *Appendix III - BEPS Policy Model Methodology*.

Energy, Cost, and Greenhouse Gas Emissions

The analysis team calculated the annual and cumulative energy use and associated costs and emissions for the years 2021-2039, show in Table 16, without a BEPS policy. No capital cost was assumed under the baseline case, as the technical analysis considered the total capital cost of upgrades without including business as usual equipment replacements.

Table 16. The estimated covered buildings' energy and GHG emissions characteristics, both annual and cumulative over the technical analysis period.

Cumulative Countywide Baseline 2021-2039	Annual Total (2021)	2021-2039 Cumulative Totals (without a BEPS policy)
Electricity Use [Billion BTU]	12,212	293,057
Gas Use [Billion BTU]	6,574	157,772
GHG emissions of covered buildings [Million tonsCO_2e]	1.33	16.91
Energy Cost [Million$]	$602	$14,445
Capital Cost [Million$]	N/A	N/A

The results of the BEPS analysis are shown in Table 17 along several metrics of capital costs, energy, GHG, and on-site fossil fuel burning which correlates to local air quality.

Table 17. Estimated countywide impact of three building energy performance targets, summing cost, energy savings, and GHG for each Target Method.

Countywide Impact of BEPS 2021-2039	Energy Efficiency (EE) Target	EE-ZNC midpoint	Zero-Net-Carbon (ZNC) Compatible Target	
Electricity Site Energy Savings	17,360	14,700	12,430	Billion BTU
Gas Site Energy Savings	40,650	56,970	75,700	Billion BTU
Cumulative GHG Savings of Policy	2.38	3.26	4.25	Million Tons CO_2e
GHG Savings by grid cleaning (external to a BEPS program)	*15.0*	*15.0*	*15.0*	*Million Tons CO_2e*
Energy Cost Savings	$1.2	$1.3	$1.5	Billion
Total Capital Cost*	$1.7	$2.4	$3.3	Billion
Abatement Cost	$710	$750	$770	dollars / tonCO_2e
On-site fossil fuel reduction *(correlates to local air quality)*	46%	66%	86%	Percent of annual baseline
Annual GHG Reduction (% lower than 2019 baseline)	83%	88%	94%	Percent of annual baseline

**Total capital cost is gross cost and does not factor in costs that would have been incurred for normal end-of-life replacement of equipment. Cost does not include financial assistance available for energy efficiency retrofits.*

The eliminated energy use is primarily driven by reduction in on-site fuel burning through energy efficiency and electrification. Electric energy efficiency is also incorporated, though those reductions in overall electricity use are partially offset by increases due to electrification of fossil fuel systems. A summary of energy use reductions over the technical analysis period by BEPS Group is shown in Figure 10 for the ZNC target.

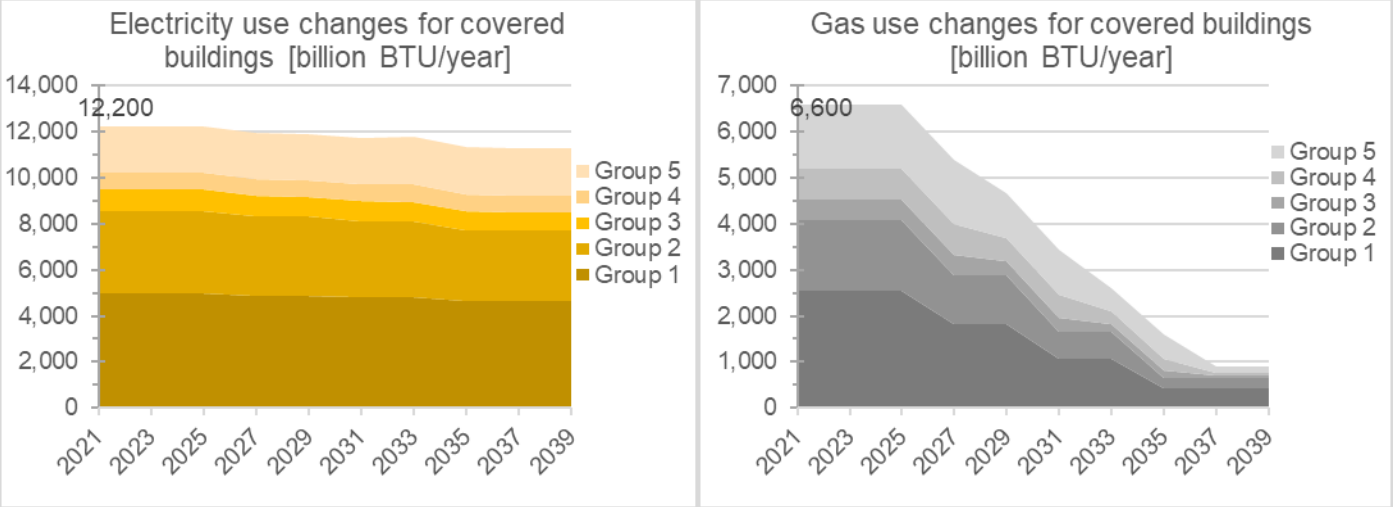

Figure 10. On-site fossil fuel ("gas") and electricity use reductions associated with meeting the ZNC target across the groups of covered buildings during the technical analysis period. Energy use is stacked so the top of the groups represents the covered buildings total.

Greenhouse Gas Impact Calculation

The annual and cumulative greenhouse gas (GHG) impact of each building performance standard option was calculated using current and projected energy supply and compliance deadlines of different building types. The GHG impact was calculated in kilograms or metric tons carbon dioxide equivalent (CO_2e).

Table 18. Greenhouse Gas intensity coefficients for natural gas and electricity.

Energy Type	$kgCO_2e$/ Million BTU	Year for Grid Condition	Data Source
Natural Gas	54.72	All years	MC GHG Inventory[33,34]
Electricity Baseline	95.71	2018	MC GHG Inventory[33,35]
“Emissions Free” Grid	2.696	2035 (variable)	CNCA EBPS Tool[36]

The graphic in Figure 11 shows the annual emissions change for covered buildings using the above GHG assumptions with a starting point in 2021 and going out to 2039. Emissions savings begin after 2025 (shown in dark blue), when the first interim compliance period dates spur energy retrofits.

[33] https://www.montgomerycountymd.gov/green/Resources/Files/climate/ghg-inventory-data-summary-july-2020.xlsx
[34] Uses 2018 natural gas emissions divided by natural gas consumption to calculate factor. Includes the kgCO2e/kBTU for fugitive natural gas emissions from the same inventory.
[35] Uses 2018 total electricity emissions divided by total electricity consumption to calculate the GHG-per-energy factor.
[36] Page 30: http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Targets-and-Metrics-Memo-Final-March2020.pdf

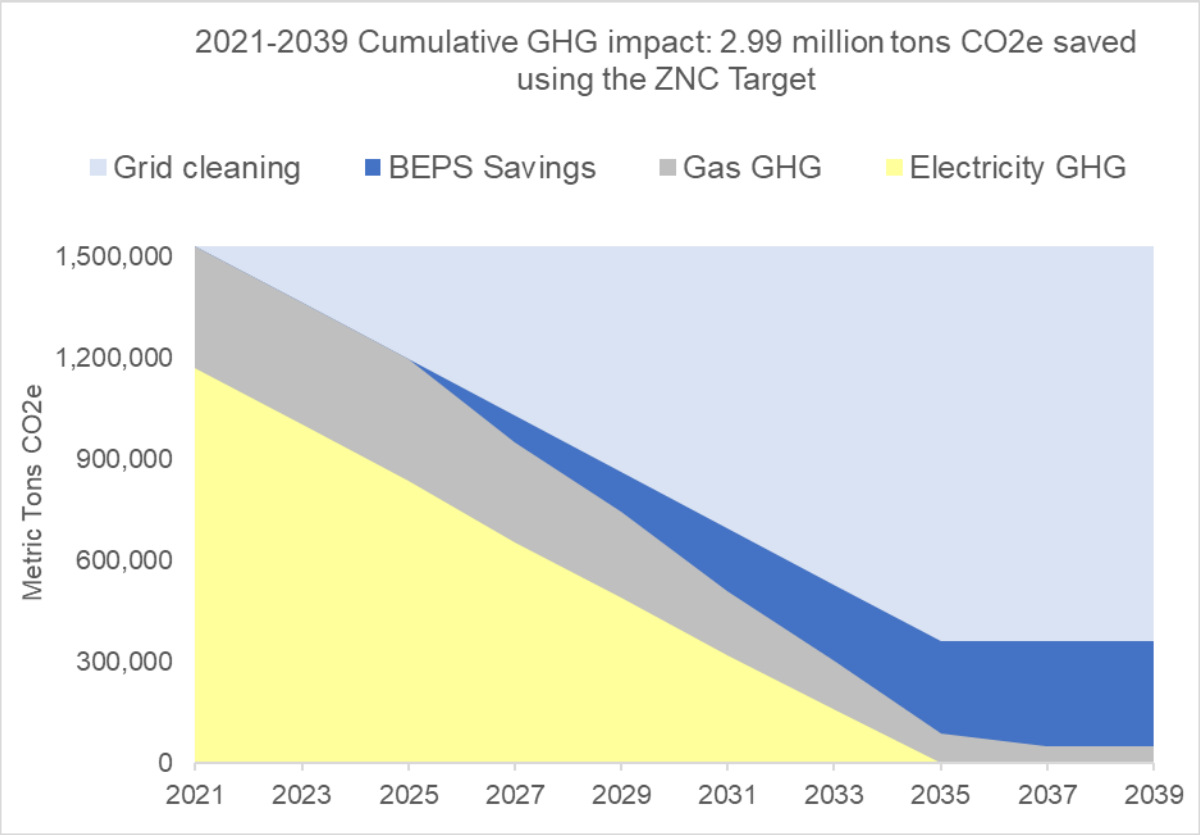

Figure 11. Cumulative GHG impact from 2021-2039 assuming carbon-free electricity supply and the proposed BEPS timeline to reach the ZNC targets for all groups.

If the County's electricity emissions intensity (EEI, in kilograms of carbon dioxide equivalent per kilowatt-hour, kgCO2e/kWh) for purchased electricity was zero, i.e., to be considered "zero-emissions" or "carbon neutral" by 2030, as stated in the CAP[37], the annual emissions from building energy use would drop by 94% for covered buildings from the 2019 baseline, with 70% coming from reductions in EEI and 26% coming from buildings performing retrofits to meet the performance standard. To eliminate the remaining fossil fuel use and resulting emissions, a more specific restriction for on-site emissions may be necessary.

Clearly, the transition to a carbon-free electricity supply will result in the majority of carbon emissions savings in buildings. The building energy performance standard would do two things to enable further emissions to reach the county's climate action plan goal: 1) the reduction in electricity use through efficiency measures would ease the burden on the supply side to provide electricity from carbon-free sources, and 2) the reduction of on-site emissions through fossil fuel efficiency and eventual electrification may be the only way to achieve carbon neutrality.

Using a building energy performance standard and the targets developed in this technical analysis would get the county much closer to a carbon neutral scenario, resulting in a 97% annual emissions reduction versus 76% annual emissions reduction achieved through the cleaning of the grid alone. As shown in Table 19, the difference between the targets is more pronounced under a carbon-free electricity supply than using today's relative emissions-intense electricity supply.

[37] Supra 1, page 88.

Table 19. The annual emissions reduction impact of the site EUI targets in this technical analysis. Reductions are of annual emissions at the final target year (e.g., 2037 or beyond).

Annual Savings in Million Metric Tons CO_2e (% reduction from baseline)	**No BEPS**	**EE**	**EE-ZNC midpoint**	**ZNC**
Electricity supply does not change from today	1.53 (0%)	1.24 (19%)	1.19 (22%)	1.13 (26%)
"Carbon-free" electricity supply	0.36 (76%)	0.19 (87%)	0.12 (92%)	0.05 (97%)

Impact of Delaying the Compliance Deadlines

If all compliance deadlines were delayed beyond the dates in the proposed BEPS policy, the county would experience additional energy use, GHG emissions, and operating costs. In addition, many buildings would replace equipment with similarly inefficient equipment before the policy would go into effect, locking in high energy use and emissions for a longer period until that new equipment reaches end of useful life. This section has some examples of the difference a timeline delay can make on the economic activity a BEPS program can create.

The proposed timeline created a $1.7 billion investment in building retrofits by 2029, while a four-year delay (i.e., an additional compliance cycle) in the program pushed that level of investment out to 2033. The comparison in Figure 12 shows how productive investment in building retrofits would be delayed for the BEPS groups.

The efficiency and electrification retrofits that would be required to comply with the BEPS targets can improve the building for the occupants by:

1) Adding efficient cooling to buildings without adequate air conditioning[38],
2) Reducing on-site combustion products that decrease indoor[39] and outdoor[40] air quality,
3) Repairing building envelope issues that have created moisture issues, improving indoor air quality through repairs[41], and
4) Lowering energy bills by using efficient equipment.

To realize these benefits to county residents, the retrofits required to meet this technical analysis's performance targets should be undertaken as soon as feasible. Delaying action may result in buildings replacing failing equipment with in-kind replacements that do not improve occupant wellbeing. Those "wasted" capital costs of in-kind equipment replacement are not captured in this analysis.

The benefits to county residents hinge on the timeline of BEPS Groups 4 and 5. Under a four-year delay, improvements to residential buildings would be delayed until the mid- to late-2030s. The estimated total capital cost differences are shown in Figure 12.

[38] Yu Ann Tan and Bomee Jung. "Decarbonizing Homes: Improving Health in Low-Income Communities through Beneficial Electrification". RMI, 2021. Pages 19-21 provide a good overview of cooling benefits. http://www.rmi.org/insight/decarbonizing-homes.

[39] Wendee, Nicole. "Cooking Up Indoor Air Pollution: Emissions from Natural Gas Stoves". Environmental Health Perspectives, Volume 122, Number 1. January 2014. https://ehp.niehs.nih.gov/doi/10.1289/ehp.122-a27

[40] Combustion of fuels such as natural gas releases various air pollutants such as particulate matter and nitrogen dioxide. See US EPA. https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm and https://www.epa.gov/no2-pollution/basic-information-about-no2#What%20is%20NO2

[41] National Research Council. "Review and Assessment of the Health and Productivity Benefits of Green Schools: An Interim Report". Chapters 2 and 3. National Academies Press. 2006 https://www.nap.edu/read/11574/chapter/4

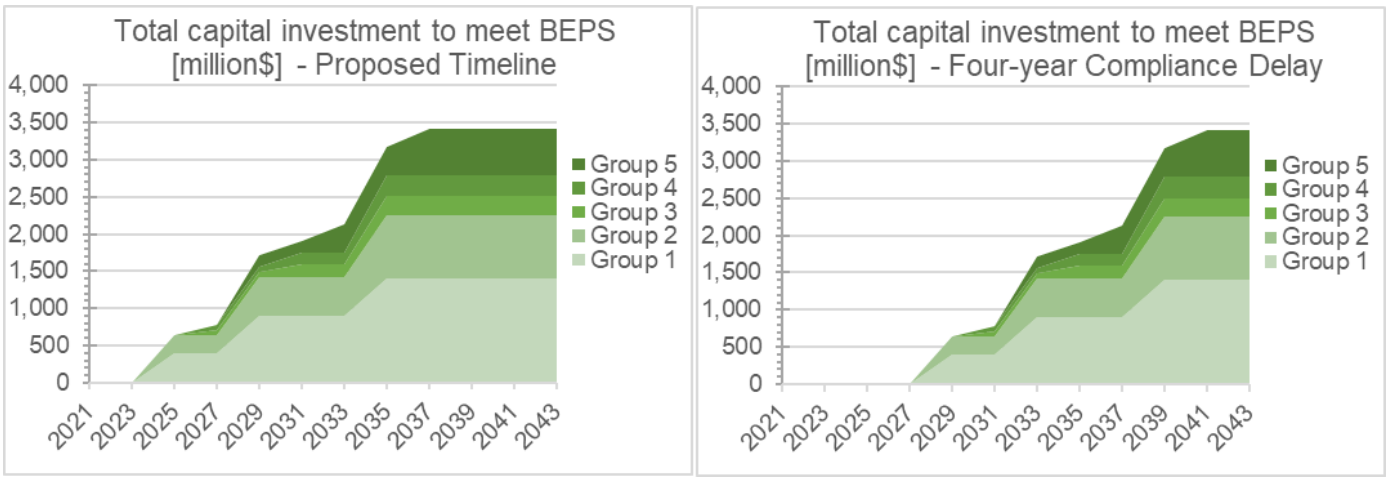

Figure 12. Comparison charts showing the total capital investment of the BEPS policy using different timelines. Groups 1-3 are commercial, while Groups 4 and 5 are multifamily residential building types.

Overall, the end goal of emissions reduction is still achieved, but at a later date. See *Appendix VIII - Sensitivity Tests on Model Impact Results* for more discussion on how alternative capital cost trends (increases or decreases in cost of different technology over time) can change the total capital cost of the BEPS program.

APPENDICES

APPENDIX I - RECOMMENDATIONS FOR BUILDING GROUPS

Recommendations

1. Use building types as defined in the Commercial Building Energy Consumption Survey (CBECS)[42], with sub-types as necessary. The CBECS groupings and data set inform much of the EPA ENERGY STAR Portfolio Manager ratings and adjustments around ENERGY STAR scores.
2. Use SDAT Land Use Codes for mapping to the CBECS building use types. The Land Use Codes are available on the parcel level, which may mask some sub-parcel building use types.

Montgomery County Building Group Classification Method

Of the many potential ways to categorize buildings into groups for the purposes of performance standards, two grouping methods were compared in this technical analysis. One is to use the Energy Information Agency's (EIA) Commercial Building Energy Consumption Survey (CBECS), which serves as much of the data source behind the EPA Portfolio Manager and associated tools. All buildings that use the Portfolio Manager tool for benchmarking are assigned a use type that can be cross-referenced to a CBECS use type—regardless of whether the building is eligible to earn an ENERGY STAR Score. All BEPS-covered buildings in the County would need to have a space use assigned.

> ***CBECS Principal Building Activity:*** *The activity or function occupying the most floorspace in a building. The categories were designed to group buildings that have similar patterns of energy consumption. Examples of various types of principal activity include office, health care, lodging, and mercantile and service.*[43]

Another method is the International Building Code (IBC) occupancy groups, which is adopted into the Building Code 2018 of Maryland, Section 302.1: Occupancy Classification and Use Designation[44]:

> ***IBC Occupancy Groups Definition:*** *Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures shall be classified into one or more of the occupancy groups listed in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure.*

The CBECS building groupings are more appropriate than the IBC groupings because of how the groups are defined to differentiate energy use patterns (CBECS), rather than occupancy risk patterns (IBC).

The Maryland Land Use Code field in the tax parcel data set was matched up to both building group types to determine what the covered buildings list would look like and how different building types would be grouped together or separated based on the two grouping methods. A detailed list of the building types is in *Appendix IX - Summary of Data Sources.* Figure 13 shows a summary of this matching.

[42] EIA CBECS Building Type Definitions. https://www.eia.gov/consumption/commercial/building-type-definitions.php
[43] "CBECS Terminology – Principal Building Activity". https://www.eia.gov/consumption/commercial/terminology.php#P
[44] Building Code 2018 of Maryland, Section 302.1. https://up.codes/viewer/maryland/ibc-2018/chapter/3/occupancy-classification-and-use#3

Figure 13. Building Groupings by CBECS type (left) and by IBC type (right). Filtered for coverage (no MCPS, MCC, state or federal buildings, industrial buildings, only individual buildings over 25,000 SF). These charts are commercial only, not multifamily, which would all be R-2 per IBCC. 44 Million SF total. This does not use final covered buildings list, which was refined later in the technical analysis.

A detailed review of the building groups' energy profiles is in *Appendix II - Montgomery County Energy Use Distributions Overview.*

APPENDIX II - MONTGOMERY COUNTY ENERGY USE DISTRIBUTIONS OVERVIEW

Using 2019 benchmarking data provided by DEP, with data cleaning as described in *Benchmarking Data from Montgomery County*, distributions of Site EUI broken down by energy source are shown below.

In these charts:

- Electricity EUI is represented as yellow
- Fossil EUI is represented as grey; fossil energy use includes on-site consumption of natural gas and fuel oil
- District energy is represented as green; district energy was present for buildings on a campus with a shared central plant such that the building received heated or chilled water instead of electricity or fossil fuel. District energy can be entered in Portfolio Manager during benchmarking.
- Each column is a single building; the width of the column corresponds to an individual building's floor area.
- Buildings are sorted by total site EUI descending from left to right.
- Some charts have ENERGY STAR scores (0-100) for individual buildings represented as blue dots.

These charts show the diversity of electricity and gas use across building types. Building types with fewer than three buildings are not shown, including: Food Service, Public Order and Safety, and Service building types.

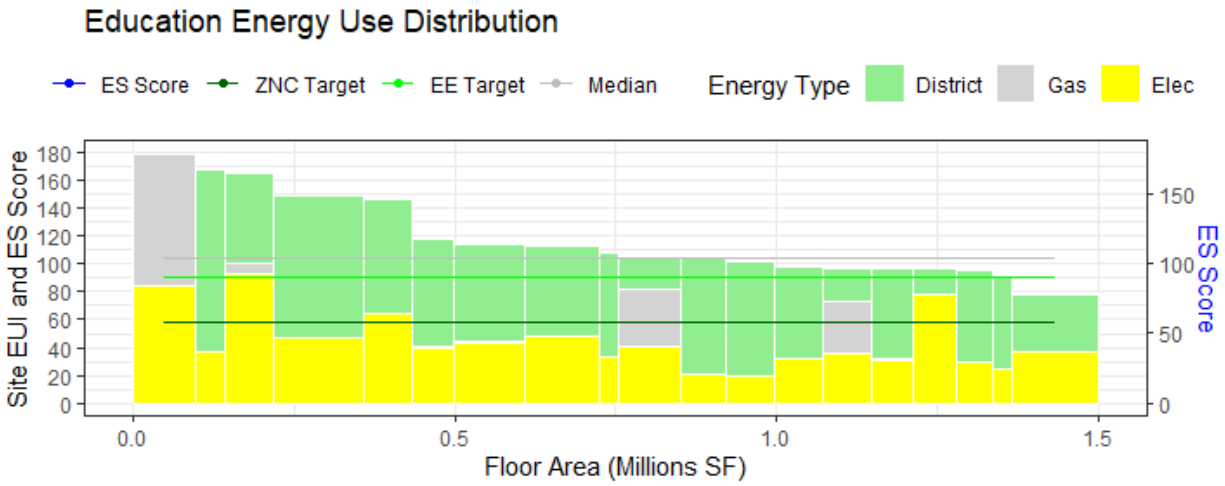

Figure 14: Energy Use Distribution of Education Facilities and Energy Star score, if applicable

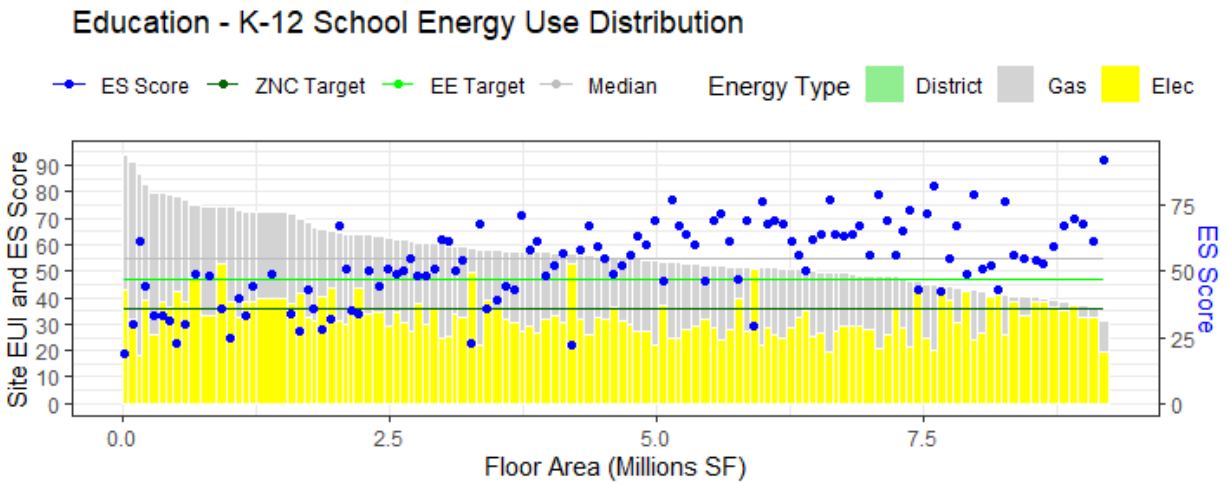

Figure 15: Energy Use Distribution of K-12 School Facilities and Energy Star score, if applicable

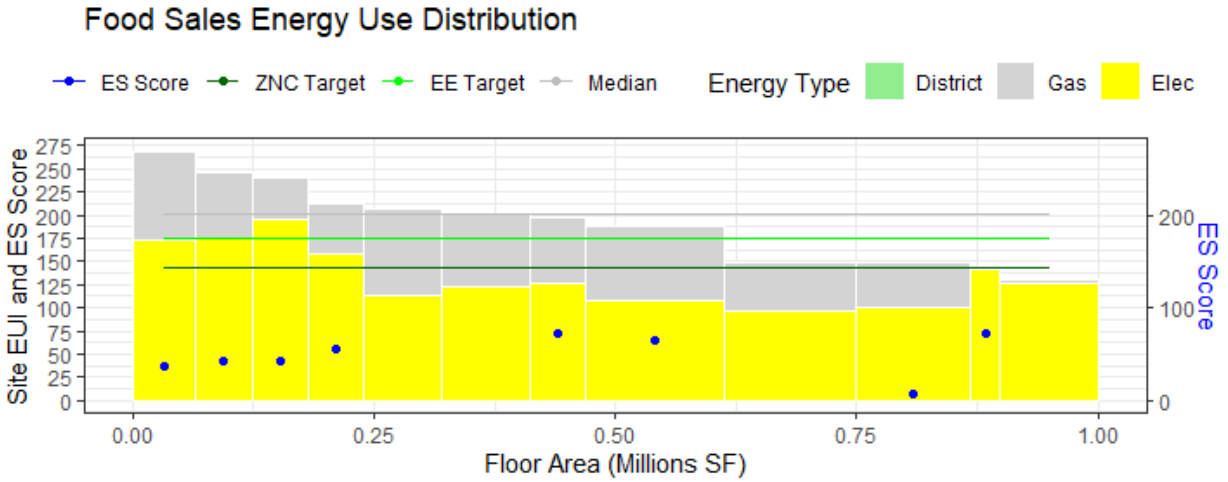

Figure 16: Energy Use Distribution of Food Sales Facilities and Energy Star score, if applicable

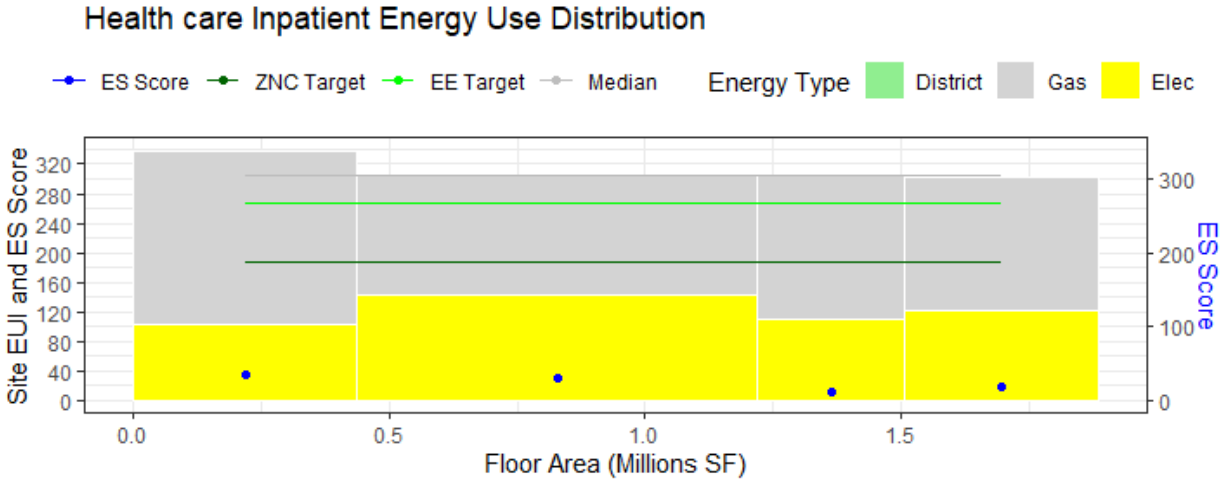

Figure 17: Energy Use Distribution of Inpatient Health Care Facilities and Energy Star score, if applicable

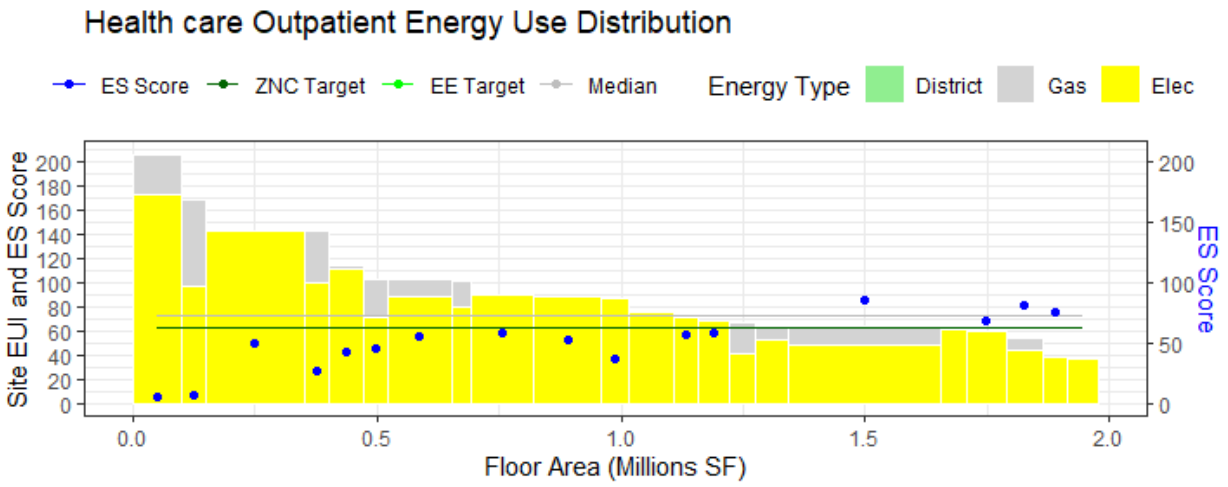

Figure 18: Energy Use Distribution of Outpatient Health Care Facilities and Energy Star score, if applicable

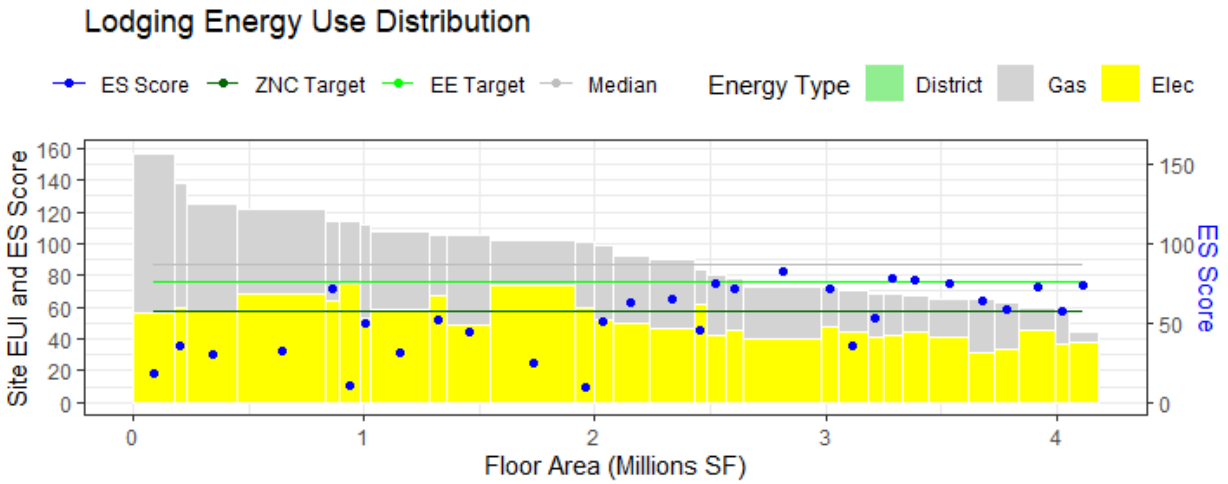

Figure 19: Energy Use Distribution of Lodging Facilities and Energy Star score, if applicable

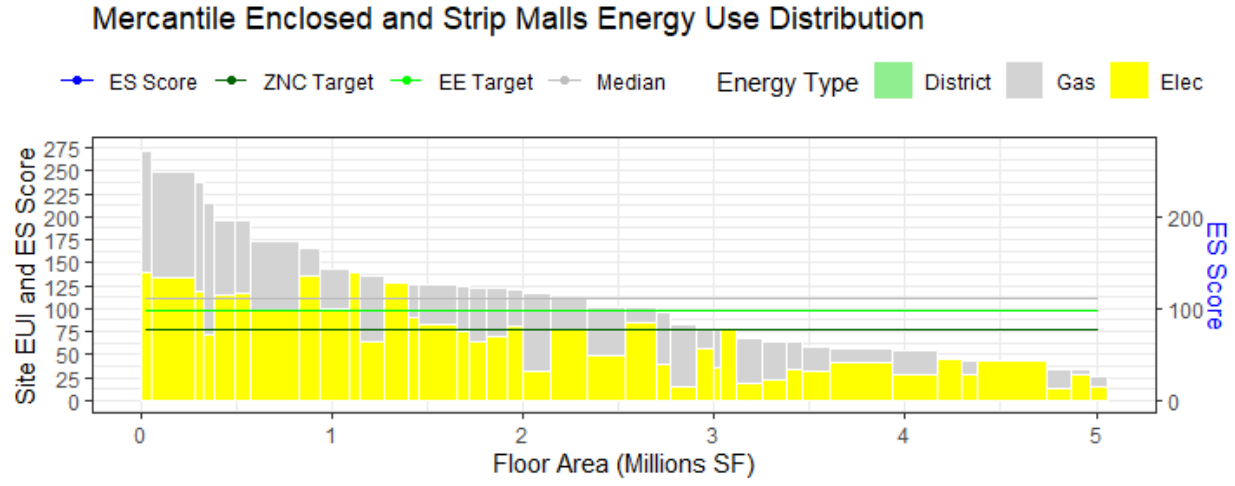

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Figure 20: Energy Use Distribution of Mercantile Enclosed and Strip Malls and Energy Star score, if applicable

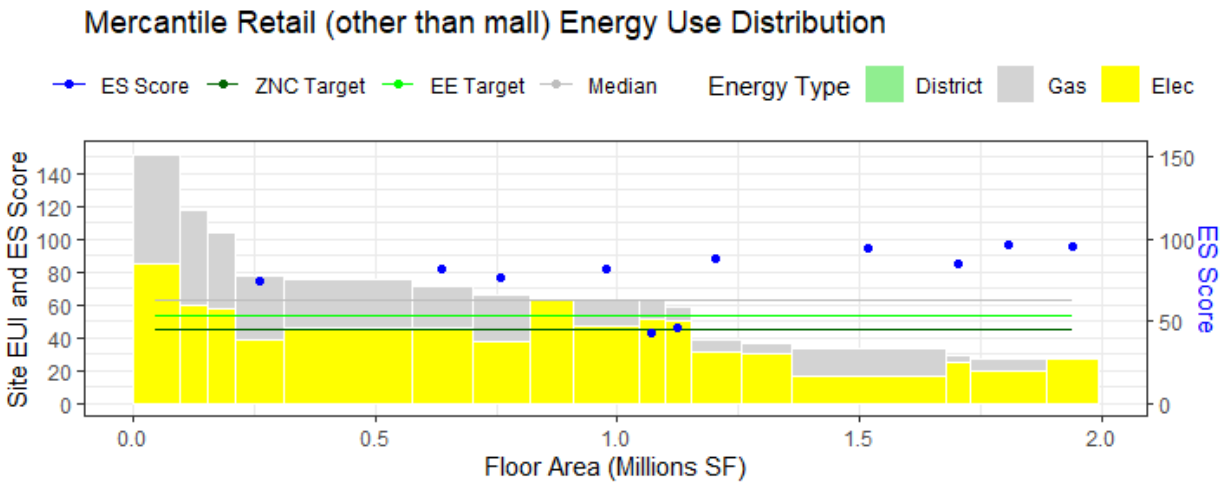

Figure 21: Energy Use Distribution of Mercantile Retail (other than malls) and Energy Star score, if applicable

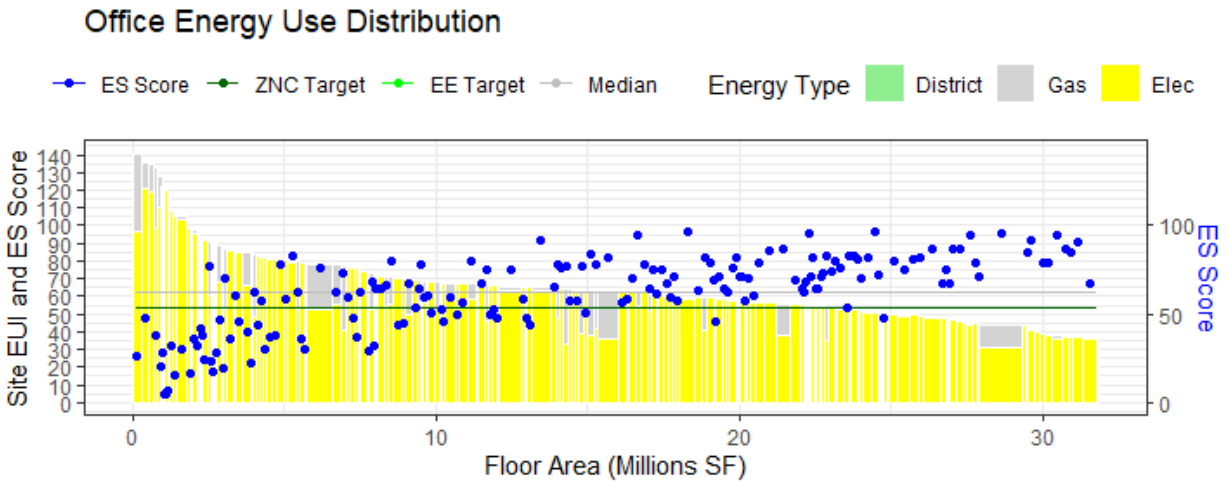

Figure 22: Energy Use Distribution of Office Space and Energy Star score, if applicable

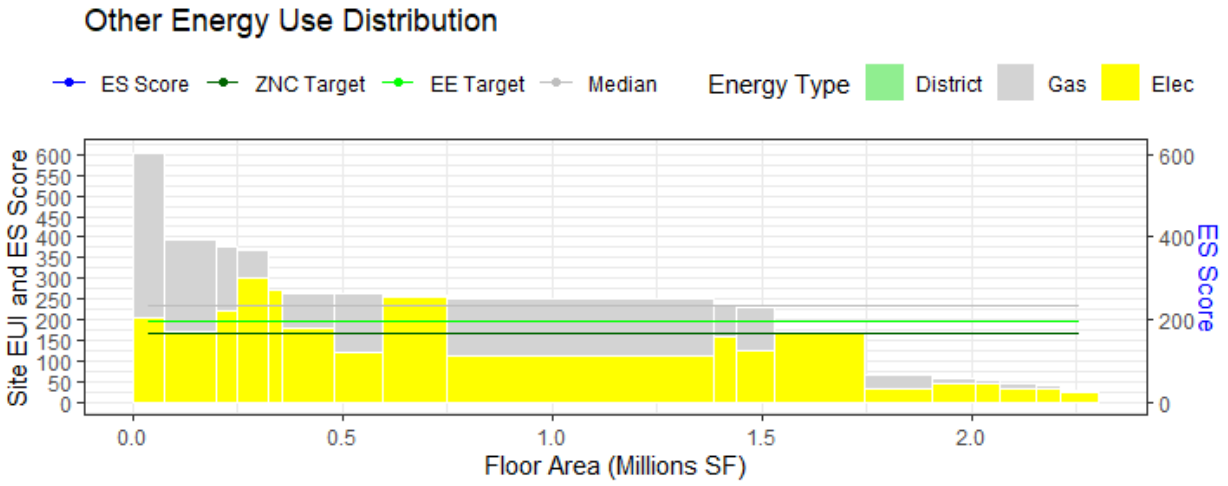

Figure 23: Energy Use Distribution of Other Spaces and Energy Star score, if applicable

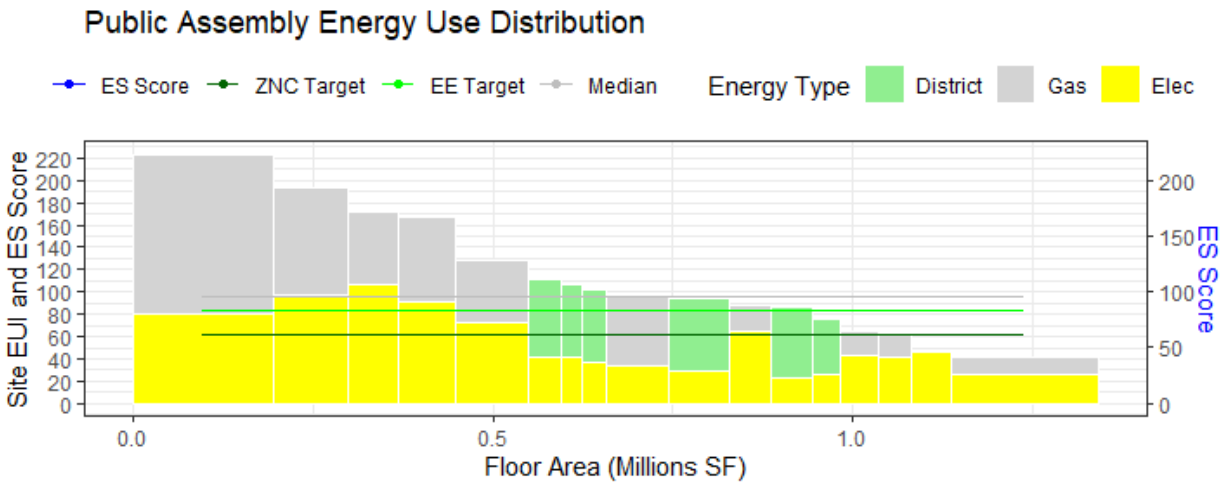

Figure 24: Energy Use Distribution of Public Assembly Facilities and Energy Star score, if applicable

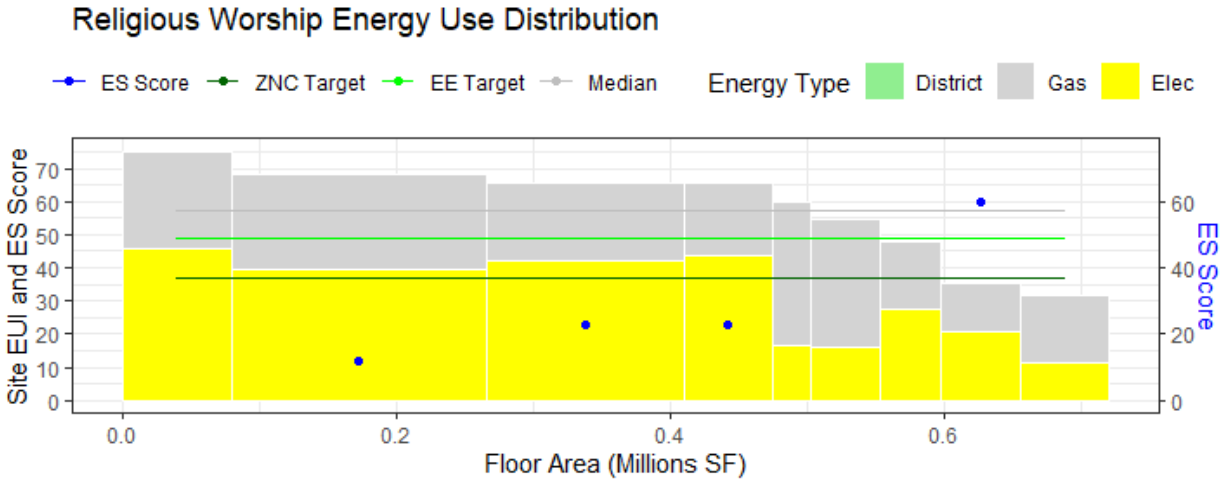

Figure 25: Energy Use Distribution of Religious Worship Facilities and Energy Star score, if applicable

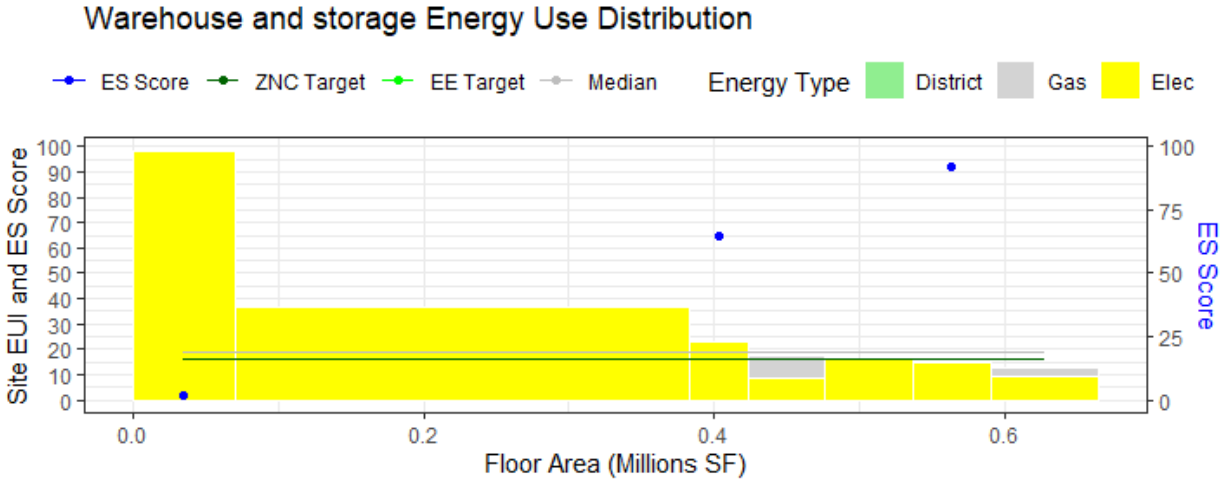

Figure 26: Energy Use Distribution of Warehouse and Storage Facilities and Energy Star score, if applicable

Details for Selected Typologies

Multifamily

For the policy impact model, the following process was used to identify multifamily buildings and categorize into the above sub-groups:

Determining height: if the parcel had a height value in the "NO_STORIES" value, then greater than 3 stories was classified as "Tall", and "Short" otherwise. If the height field was blank or zero, then the Land Use Code was referenced, with the Garden Apartments' codes 112, 113, 114, and 118 being "Short", and "Tall" otherwise.

Determining age: the parcel's YEAR_BUILT field was referenced. If before 1980, the tall buildings were classified as "Old", and "New" otherwise.

Multifamily buildings are grouped into three sub-groups:

- **MF-Short:** all ages, one to three stories: these buildings tend to have little or no interior common areas, no elevators, include garden complexes, and have little mixed use or amenity space in the building. They may also be built to residential code, which generally applies to buildings less than four stories.
- **MF-New-Tall:** post-1979 construction, greater than three stories: these buildings have interior common areas, typically have a provision for cooling (through wall A/Cs or central cooling), and amenity or mixed-use space at street level. As such, this group tends to have higher electricity use as a portion of the total. In addition, these buildings have lower heating loads through the use of more insulation and higher efficiency heating system layouts.
- **MF-Old-Tall:** pre-1980 construction, greater than three stories: these buildings have interior common areas, do not have a provision for cooling (using window A/Cs, some central cooling in very large buildings), and little amenity or mixed-use space at street level. In addition, this group has less insulating envelope materials and could use less efficient heating systems such as steam radiators.

These groupings may have distinct performance limits due to existing equipment and building layout. A single building performance standard for the entirety of multifamily buildings may be appropriate, as long as it considers the highest EUI threshold of these three groups. Potential energy standard targets are described in *Site Energy Use Intensity Performance Targets*.

Benchmarking Data from Washington, DC

While Montgomery County is not yet collecting enough multifamily building benchmarking information to create building performance targets, the analysis team referenced energy information from Washington, D.C. The DC area has similar buildings with energy use characteristics that can be mapped to the County's multifamily building stock. While the distribution of age and size may be different, a groupwise mapping may work by segmenting the DC building stock into subcategories with more homogenous characteristics.

SWA has collected benchmarking data from several regions: Montgomery County, Washington DC, Philadelphia, NYC, Los Angeles, and Seattle WA. Of these, Washington, DC is closest in location and likely best for filling in gaps in Montgomery County building energy information.

The charts below show multifamily buildings from Washington, DC, using 2019 benchmarking information. The population is split into three groups as described above according to typical construction methods, amenity spaces, and the resulting changes in energy signature.

Technical feasibility targets developed for this technical analysis

The median for the group is a straight line in light grey, the EE target is shown in bright green, and the ZNC target is shown in dark green.

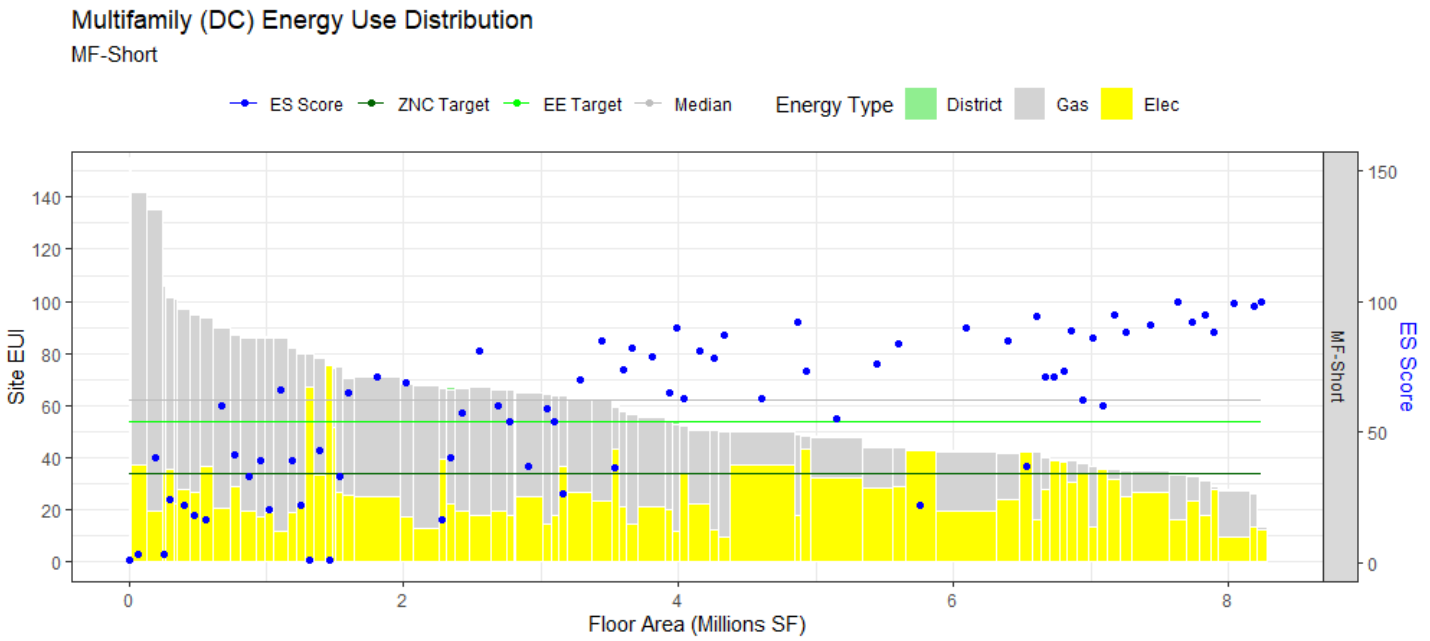

Figure 27. Energy use distribution for short (<4 stories) multifamily buildings in Washington, DC.

The MF-Short group shown in Figure 27 encompasses a reasonable estimate for garden style apartment complexes. While there are a few high electricity users, the majority of energy use comes from on-site fuel use in these building types. The higher energy users use more gas and less electricity, both in proportion and absolute terms.

The number of short MF buildings covered by the BEPS ordinance could vary significantly depending on the definition of covered bulidings.

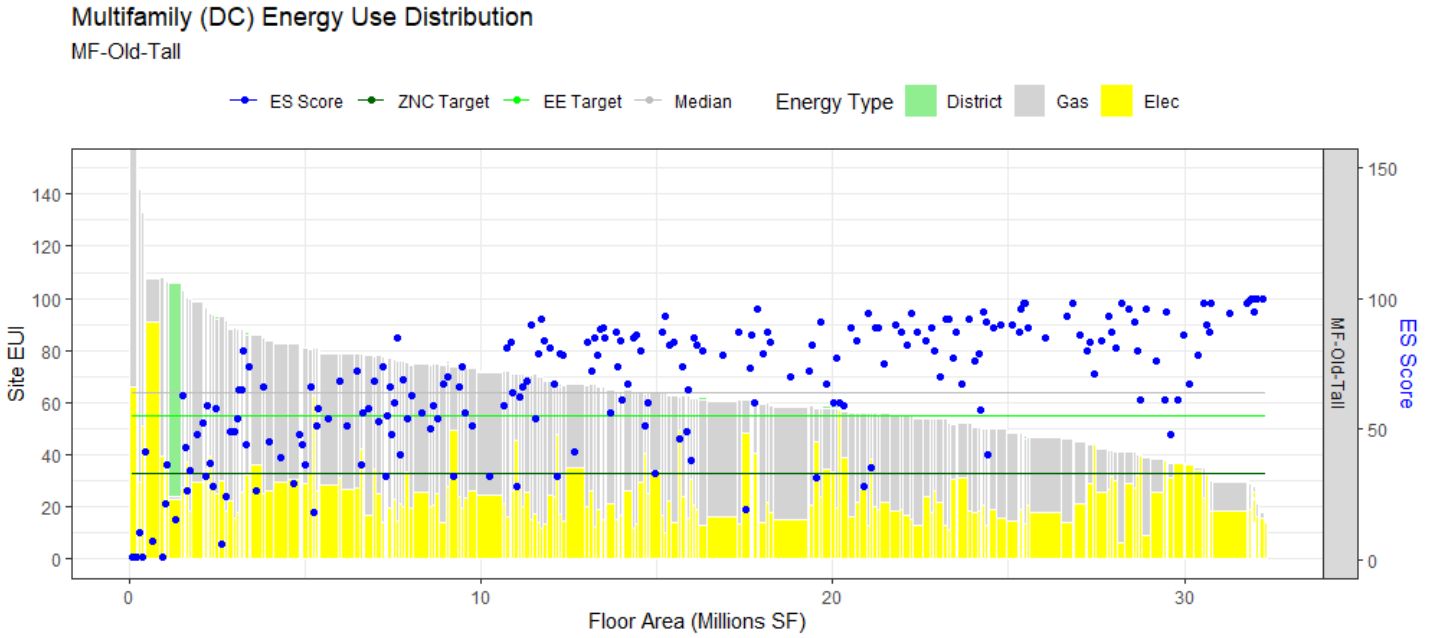

Figure 28. Energy use distribution for older tall (>3 stories, pre-1980 construction) multifamily buildings in Washington, DC.

The MF-Old-Tall group shown in Figure 28 is DC's largest group but Montgomery County's smallest multifamily group. Electricity and gas trends are similar to the MF-Short group.

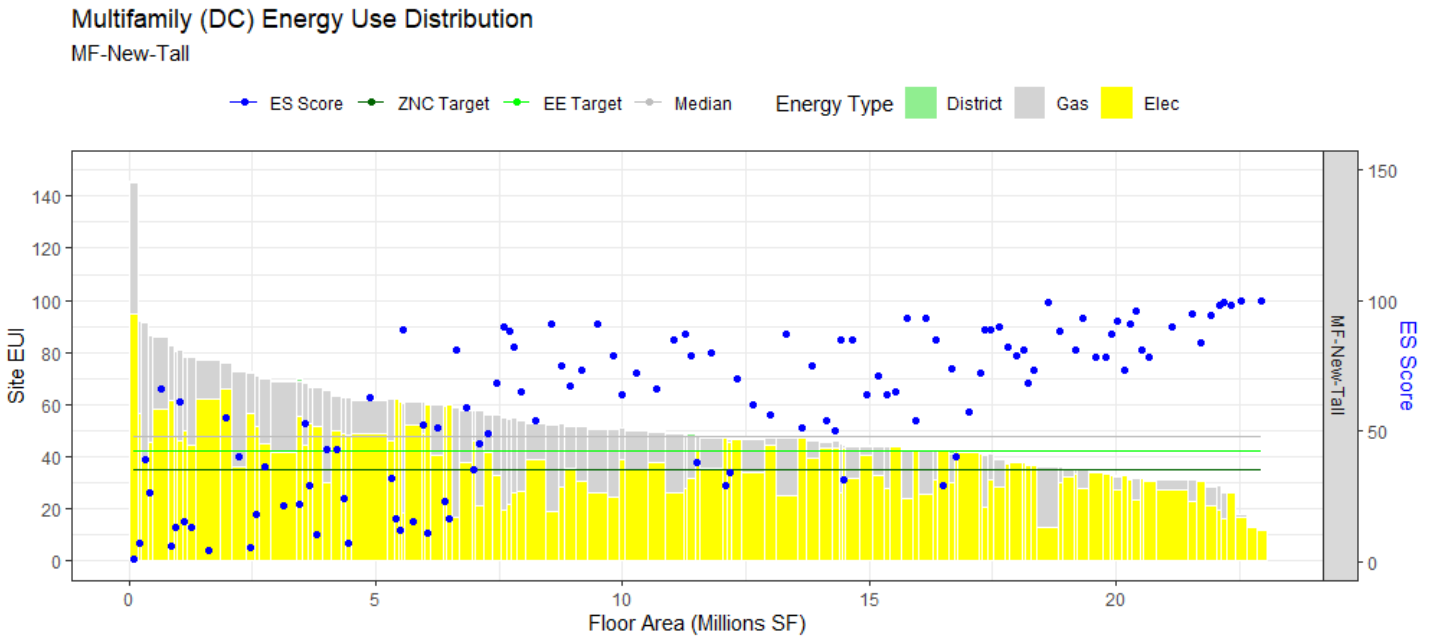

Figure 29. Energy use distribution for newer tall (>3 stories, post-1979 construction) multifamily buildings in Washington, DC.

The MF-New-Tall group shown in Figure 29 has a lower typical gas use and higher electricity use than the older and smaller multifamily groups. These buildings have more amenity spaces and more air conditioning. According to the CoStar data (see Figure 30 and *Appendix IX - Summary of Data Sources*), more than two thirds of this type is regulated affordable housing of some kind. While much of this building stock could have electric heating already, it may not be efficient heat pump heating.

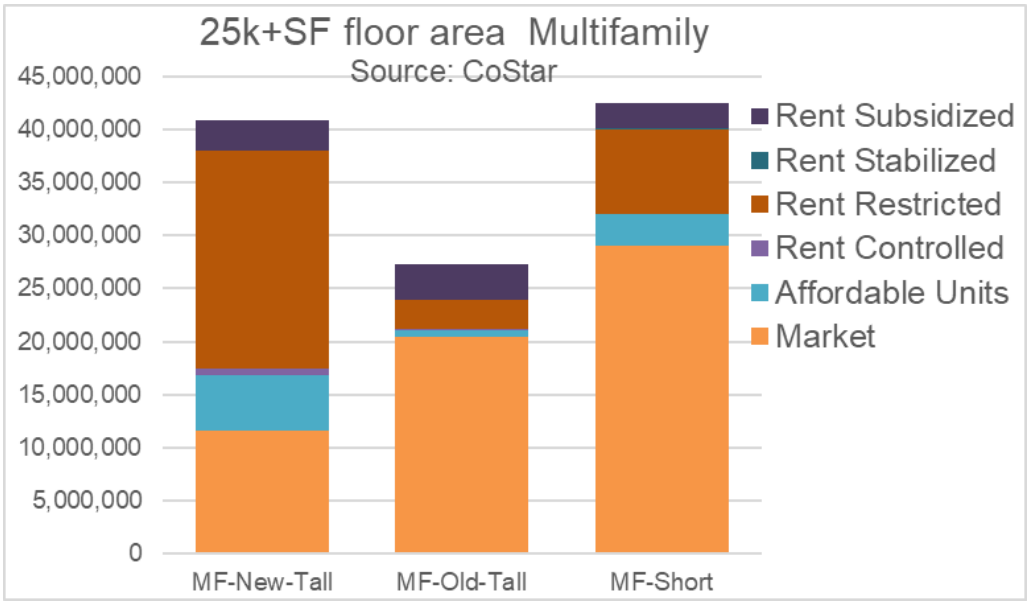

Figure 30. Montgomery County multifamily building population by subgroup and affordability status. Source: CoStar data provided by Montgomery County, accessed January 2021.

Office

From an EUI perspective, all office buildings fall within a relatively narrow range regardless of size or class. A single EUI target could work for this group. Moderate efficiency measures and electrification of the minimal gas use (makeup air space heating, mostly) would suffice to meet feasible targets.

Class A (n=103) and B (n=60) offices using CoStar[45] data matched to 2019 benchmarking data. The leftmost chart shows the buildings where a CoStar matchup based on Montgomery County Building ID (MBID, same as parcel number) or address could not be made. Center and right charts in Figure 31 on the following page show Class A and B, respectively. There are very few Class C buildings captured in this analysis. The median site EUI is nearly identical for the two groups (63 and 63.5 kBTU/SF, respectively). Current ENERGY STAR scores are shown as blue dots for each building. The Class B set has a higher tail of Site EUI than the Class A set. ENERGY STAR scores are lower for the worst-performing Class B buildings, even though they have more gas use.

As the proposed BEPS policy covers smaller buildings, more Class B-type buildings would be captured.

Based on this analysis, there is not a compelling reason to split office building targets by real estate class assignments. Targets can be set for the entire Office group, as defined by CBECS.

[45] CoStar is a “commercial real estate information company” subscription service providing access to a database of properties with characteristics relevant to the commercial real estate industry. The data was accessed by MC DEP in February 2021. www.costar.com

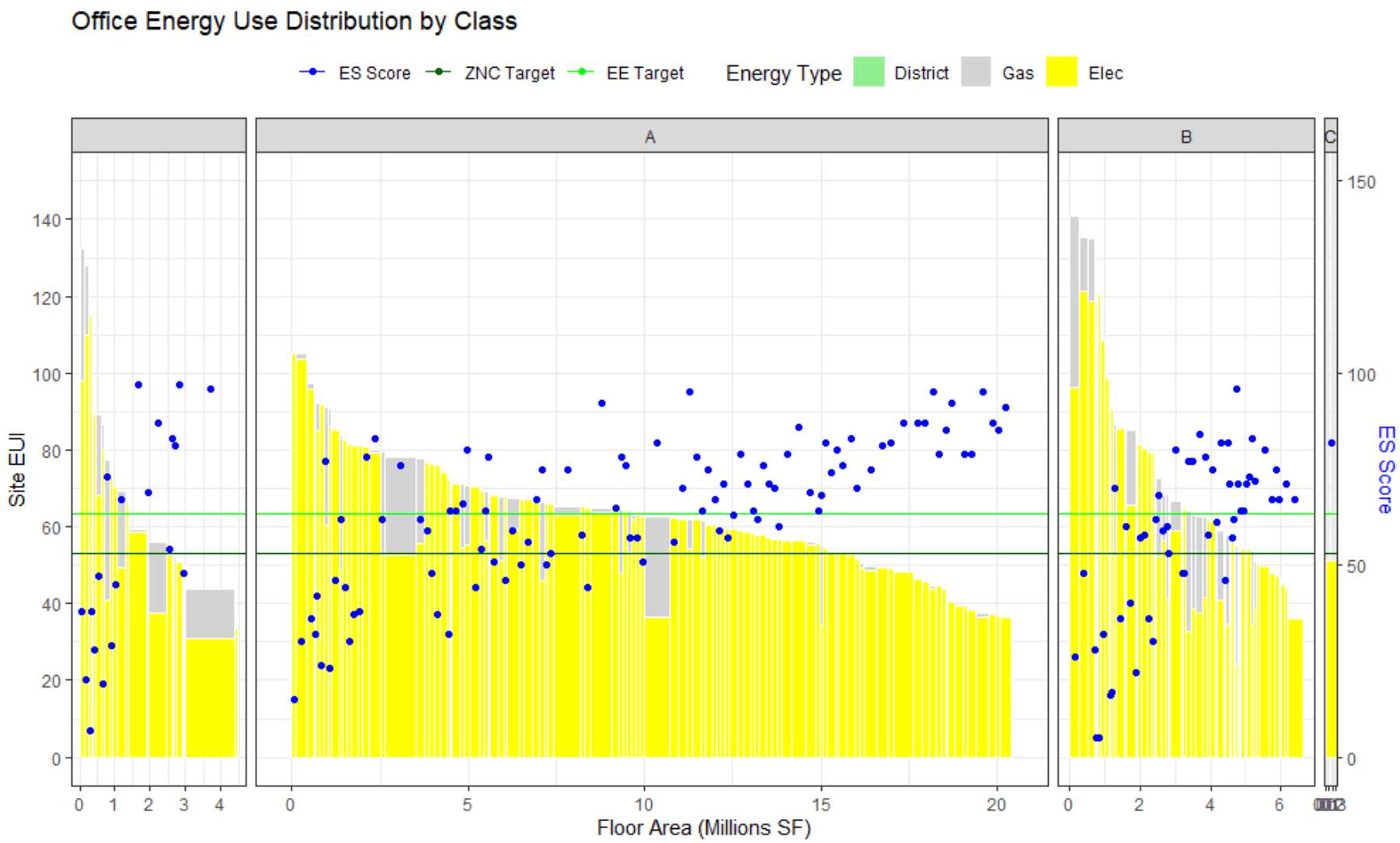

Figure 31. Office building energy use distributions, shown by real estate class. Left: unknown class, center: Class A, right: Class B. There was one Class C building identified in the database.

Retail – Various Types

Many mall (enclosed or strip mall) buildings that submitted benchmarking may not be covered in the future due to proposed building size and independent system definitions. The EUI range is large within the strip mall group. If covered, many buildings in these groups would need to electrify space and water heating to meet EUI targets.

There are four distinct occupancy types from an energy use and operations perspective. The majority of buildings use gas for a variety of end uses. For enclosed and strip malls, gas is used for multiple end uses (heat, water heating, cooking, process), while in retail it is more confined to space heating. For Food Sales, gas-fueled end uses are primarily cooking and space heating. Food Service, which includes restaurants, fast food, etc., is not represented in the MC Benchmarking data, since these buildings are mostly under 50,000 SF and often within malls and strip malls. The CBECS data has typical energy use for this type.

On the following page, Figure 32 shows the EUI profile of the three retail building types represented in the Montgomery County benchmarking data.

Compared to Offices, far fewer buildings are receiving ENERGY STAR scores, which aren't available for strip malls or restaurants or buildings with less than 75% of the space eligible for a score. This disqualifies most retail buildings except for standalone grocery stores or other retail, per EPA eligibility guidance.

Figure 33 shows a disaggregation of the Mercantile Enclosed and Strip Mall CBECS category into Strip Malls vs other malls. The "Not Strip Mall" category is more likely to be covered under the performance ordinance, while many of the "Strip Mall" types could be covered as smaller individual buildings, in which case they may fall more closely under Food Service, Food Sales, or Mercantile Retail. Still, there is considerable overlap between Strip Malls and Malls, as can be seen by how intertwined these two groups are when sorted for site EUI.

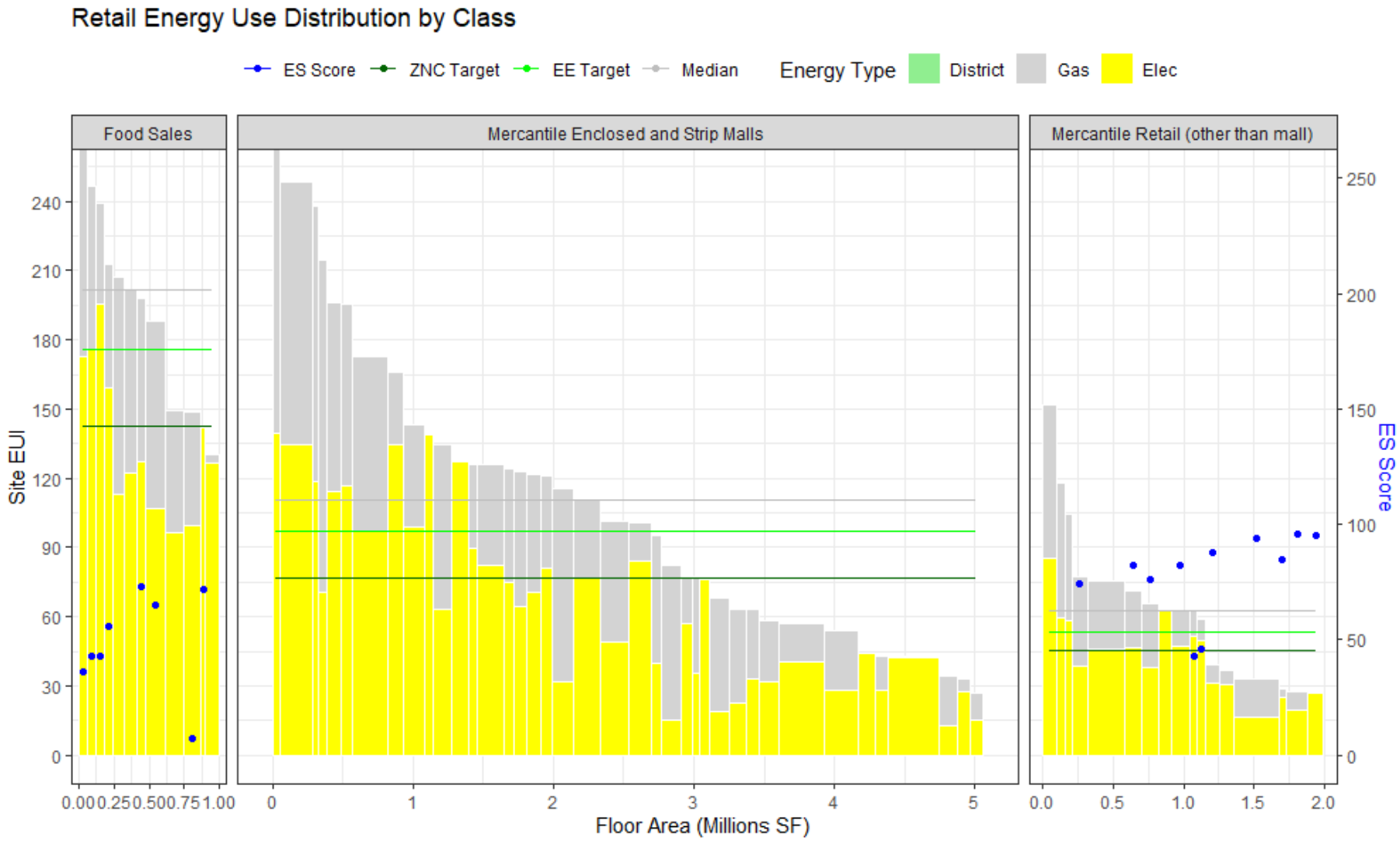

Figure 32. Mercantile building types energy use distributions.

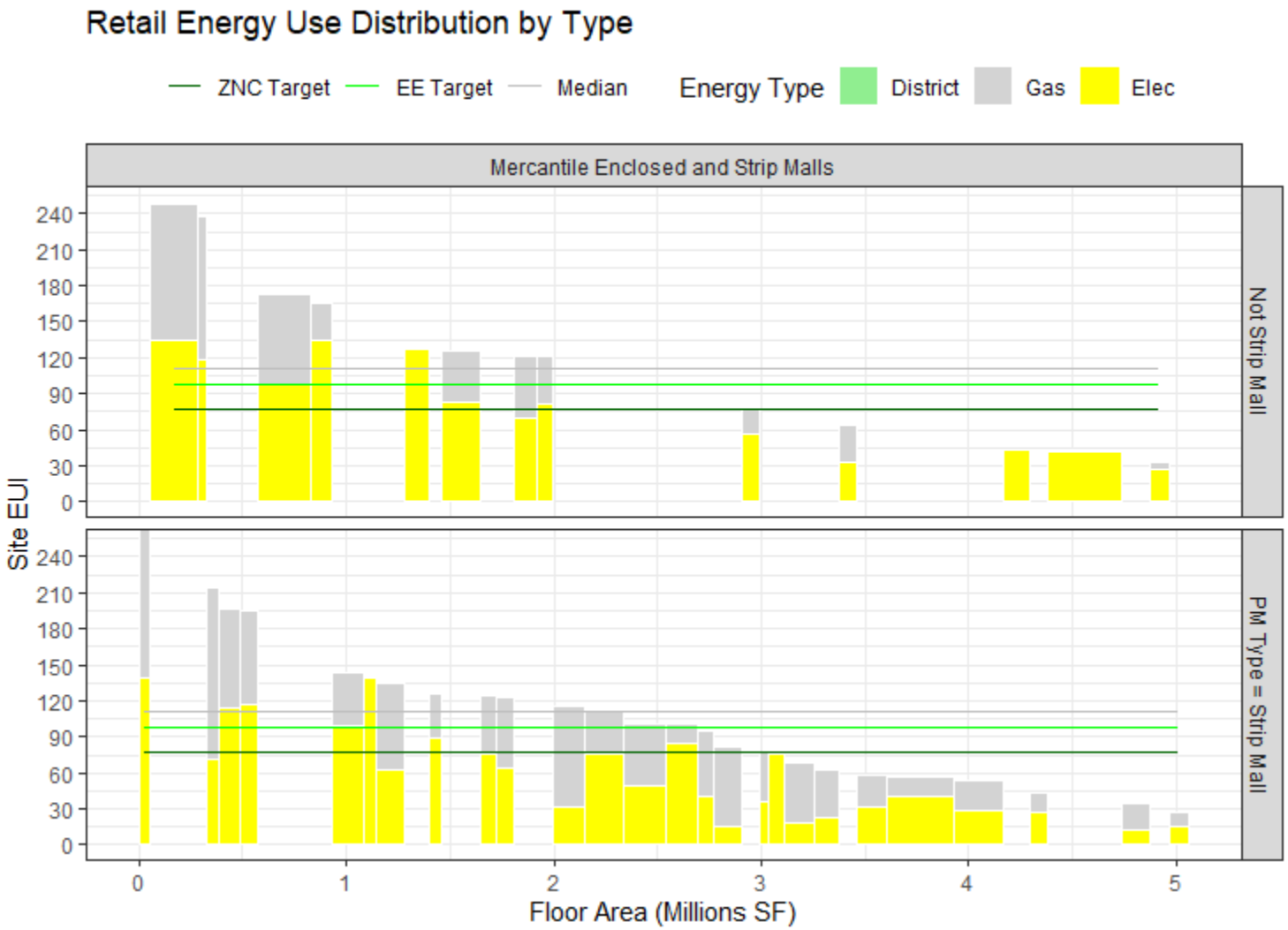

Figure 33. Mercantile Enclosed and Strip Mall category broken out to show enclosed malls and strip malls separately.

Health Care

Inpatient and outpatient health care facilities are different from one another, warranting different targets. The retrofit timeline for inpatient health care needs to consider redundancy requirements for continuous operation. Fossil-fuel on-site generation for emergency backup is a serious consideration for these buildings, often a code requirement, which may drive gas use up if used continuously for on-site electricity generation.

There is a clear difference between inpatient (hospitals) and outpatient health care facilities. The EUI of the few hospitals is fairly consistent and shows significant gas use across all submissions. Electrification technology is likely available for all end uses in a hospital, where most gas use is for space and water heating. However, some processes may be more difficult, such as steam humidification and high-temperature sanitization. Space conditioning efficiency through energy recovery ventilation can help most building types but may be limited for health care as exhausting potential pathogens without contaminating incoming air is a greater concern.

Outpatient health care facilities have a lower total EUI compared to inpatient care and more electricity driven energy use profile, with relatively minimal gas consumption coming again from space and water heating equipment. There is more diversity in energy use across buildings in this group. The total EUI is completely driven by electricity use for this group, which is likely dependent on medical equipment, and it may be difficult to improve the efficiency of such equipment.

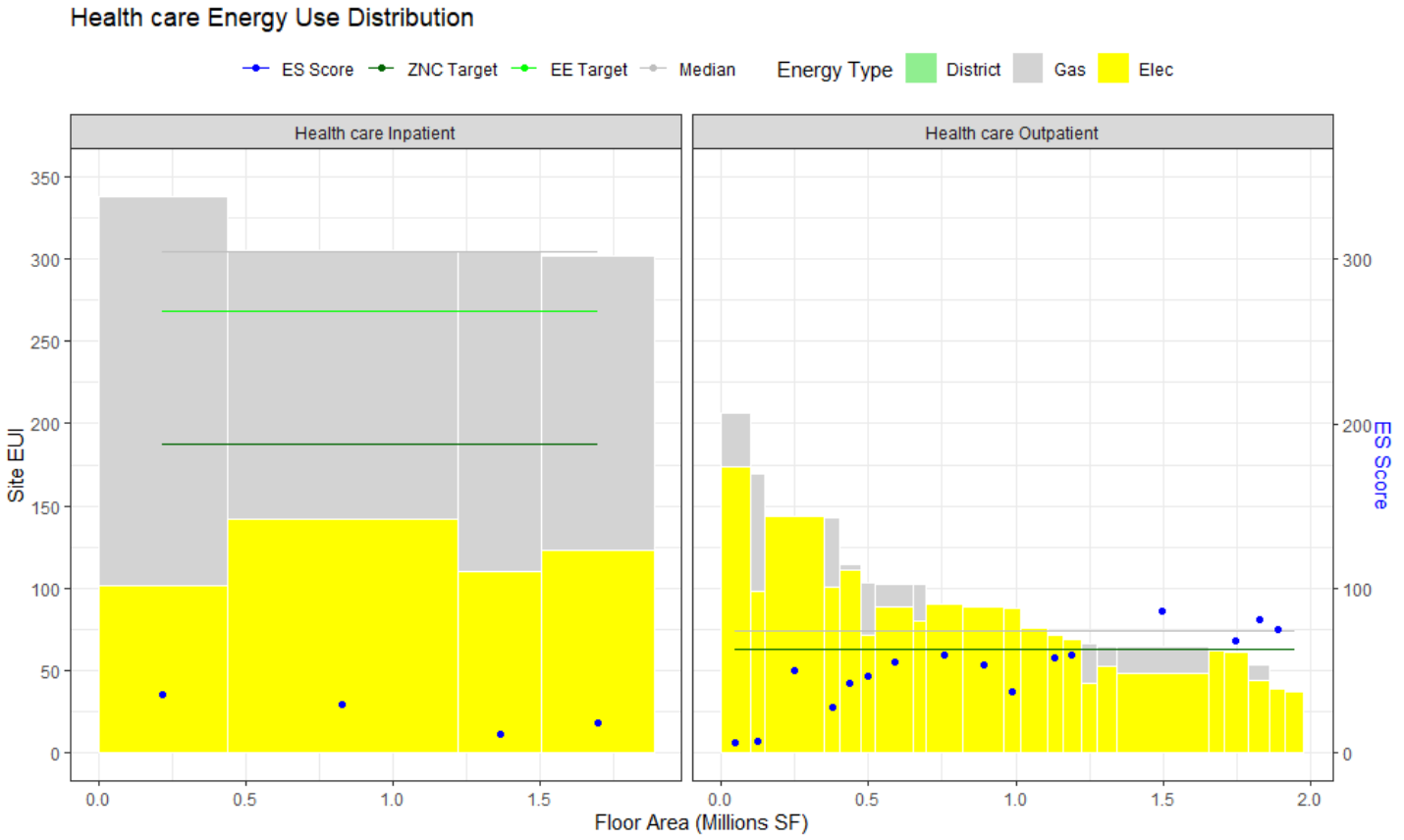

Figure 34. Health care building type energy use distributions.

APPENDIX III - BEPS POLICY MODEL METHODOLOGY

The impact of various energy performance standards was modeled using an Excel workbook that uses the covered building list and calculates the energy and energy cost. This section provides the calculation steps and assumptions made to approximate the impact at the occupancy type and countywide scale.

Creating the Model Covered Buildings List

The list of covered buildings for the policy impact model was developed by the analysis team. Using a combination of Maryland State Department of Assessments and Taxation (SDAT) property records and geographic information system (GIS) data[46], the floor area and covered buildings were identified using the size thresholds and buildings definition in the proposed BEPS policy through the following steps:

1. Documented the number of buildings located on each parcel, using the GIS data set.
2. Matched building location with a parcel to pull all associated parcel info for the building to get all related attributes about the parcel.
3. If there was one building on the parcel:
    a. Used the property tax data field for gross floor area "GR_FLR_AREA" if available.
    b. For multifamily buildings:
        i. If GR_FLR_AREA was zero, then property tax data field residential floor area "SQFT_RESID" was used.
        ii. If that was zero, then the number of residential dwelling units "RES_DWELLU" was multiplied by the median floor area per land use code from parcels with both area and unit count.
4. If there was more than one building on a given parcel:
    a. Used the GIS-calculated footprint shape area multiplied by the number of floors on parcel in tax data. If floor count was not available, the building was reviewed manually for number of floors.
    b. All buildings were assigned the same land use code for the parcel (for occupancy type assignment).
5. For commercial properties that have submitted benchmarking data to Montgomery County for calendar year 2019, used the primary occupancy type and floor area from the benchmarking submission.
6. Compared the floor area calculation for each building to the 25,000 SF threshold in the proposed BEPS policy.

Data Sources and Targets

('MoCo Com EUI Map' tab)

- Parcels were assigned a building occupancy type using submitted benchmarking data, or Land Use code if benchmarking data was not available.
    - Building type and floor area from benchmark data supersedes Land Use code
- Used benchmark data for each building where 2019 MC benchmarking data are available
    - Benchmarking energy use and primary space type was used when that building's submission:
        - Had passed Portfolio Manager data quality checks (if they were run)
        - Was not flagged for outlier energy data (See *Explanation of Cleaning Flags*)
        - Could be mapped to the SDAT parcel information by MBID or street address
- If benchmarking data was not used for a given building:
    - The parcel was assigned a random number 1-10, corresponding to a decile of the energy distribution of the parcels' occupancy type (e.g., Office, Mercantile Retail). Using benchmarked buildings energy distributions, that decile was used to look up a gas and electricity EUI based for that building group. Deciles were uniformly distributed across parcels within a group.

[46] Compiled and provided by MC DEP for this technical analysis

Sensitivity testing of this method indicates that the randomness introduces total (countywide) error of +/-3% of electricity and +/-2% for natural gas use.
    - Parcels were flagged as “estimated”.
    - For non-residential building groups, energy distributions were taken from MC benchmarking data on the tab “MoCoprofile”.
    - For multifamily residential groups, energy distributions were taken from DC benchmarking data on the tab “DCMFprofile”.
- Used DC energy profiles for Multifamily – this can be updated with MC benchmarking data when available
- Each parcel was assigned a single use type. In the proposed BEPS policy, each building could have a mix of space types that would result in an area-weighted whole building target. This analysis lacked non-primary space use types, as these were not available when using the parcels’ Land Use codes.
- Parcels were divided into BEPS groups per the proposed BEPS policy (input was a column on the ‘RetrofitModelCalcs’ tab). Groups had different timing for interim and final performance standards according to the Proposed BEPS policy text.
- Targets were a variable affecting all groups – in the model, the target type could be a percentile target (e.g., all buildings must reduce to the 25th Percentile site EUI of the group) or the CNCA targets (ZNC and EE, or the midpoint between EE and ZNC)
    - Available targets were:
        - Average Site EUI
        - 10th PCT Site EUI
        - 25th PCT Site EUI
        - 50th PCT Site EUI
        - 75th PCT Site EUI
        - 90th PCT Site EUI
        - EE
        - EE-ZNC midpoint
        - ZNC
- One target type was set for all groups on the ‘Front Page -Inputs and Outputs’ tab
- One final year target, two interim targets were linearly interpolated between starting EUI and final year target
- Model start year of 2021: this is not the start of benchmarking, it was the first year of energy reporting and other calculations.
- Model final year of 2039: Cumulative calculations were for the period 2021-2039.

Parcel Level Simulated Retrofits to Meet Targets

(‘Retrofit model calcs’ tab)

- In this model, energy use did not change if the building was below a target at a given compliance cycle, or if there wasn’t a compliance cycle deadline in that year.
- Energy use was reduced in the two-year period before each target deadline, since retrofits were assumed to happen to meet each performance standard in the period immediately before the standard’s monitoring year, meaning that all work was done in the two years before the monitoring year. While some buildings might do work more in advance, that was not captured in this model.
- Conversely, some buildings would not meet an interim standard but would catch up with more work by the next standard date. This variation in timing was not captured in the model.
- This was the retrofit roadmap assumption for each building at each compliance cycle:
    - Each building’s gas and electricity EUI are compared to the appropriate occupancy type’s “Energy Efficiency” threshold gas and electricity EUI
        - Note: “gas” in this case refers to any on-site combustion (e.g., gas, oil, propane).

- Electricity Energy Efficiency: If electricity EUI was greater than the electricity component of the EE target (elecEE), reduced electricity by 1/3 toward the EE target in each cycle. Justification for this assumption:
  - Electric equipment can be highly distributed throughout a building and may take more time to comprehensively address. The max reduction per cycle assumption spreads out electric equipment retrofits so that large reductions are not happening all at once. Large reductions in electricity use may be more disruptive to occupants. Gradual changes in electricity use are likely more tenable to owners who want to keep occupants happy.
  - Occupancy type specific capital costs are applied for electricity energy efficiency work based on commercial, residential, or hospitality spaces. Costs per energy unit are based on prior cost-benefit work for Washington, D.C.
- Gas Energy Efficiency: If gas EUI was greater than the gas component of the EE target (gas_EE), reduce gas (without electrification) to as far as the gas_EE threshold. This can happen in a single compliance cycle if necessary to meet the standard (in addition to any electricity energy efficiency upgrades). Justification for this assumption:
  - Most gas equipment is centralized and can be addressed as needed, so comprehensive energy efficiency projects can be undertaken over a few years.
  - Occupancy type specific capital costs are applied for gas energy efficiency work based on the estimated dominant gas end uses in the building, and the actual energy use reduction.
- If more reduction was needed, electrify gas end uses to meet target. Electricity increased with reduced gas use based on assumed end use proportions of different building types and electrification conversion efficiencies.
  - Electrification is mostly happening in the second and third compliance cycles, after buildings have completed energy efficiency work
  - Occupancy type specific capital costs are applied for gas electrification based on the estimated dominant gas end uses in the building after gas energy efficiency work.

Converting to GHG and Cost

('Cohort time model calcs' tab)

- Building energy use and changes for each interim and final target were added up by fuel for a total per occupancy type (e.g., total gas for Office and total electricity for Office at start, and each performance standard date)
- For each year, GHGyear = elecBTUyear*elecGHGIyear + gasBTUyear*gasGHGIyear
- For no policy scenario, GHGyear= elecBTU2021*elecGHGIyear + gasBTU2021*gasGHGIyear, meaning that BTUs are held constant at 2021 but the GHG for each energy type changes to be the projected GHGI for that year.
- Energy - GHG coefficients for the starting year were based on the 2018 MC GHG Inventory
- Cost rates are the same as used in the case study calculations.
  - $0.129 / kWh for electricity
  - $1.228 / therm for natural gas
- Energy costs can increase or decrease over time. The results in this report assumed constant energy rates. If energy costs were to change annually, the total energy costs would change according to Table 20.

Table 20. The sensitivity of total energy costs to changes in the electricity rate or gas rate.

Total energy cost change over study period based on possible rate changes		Gas rate change per year		
		-2% / year	No change (0%)	+2% / year
Electricity rate change per year	-2% / year	-13%	-4%	5%
	No change (0%)	-9%	0%	10%
	+2% / year	-4%	5%	15%

Calculation Steps for a Sample Building

('Retrofit model calcs' tab):

1) Example building: Office building (100% of the floor area is office for this example)
    a. Elec EUI: 65.8 kBTU/SF
    b. Gas EUI: 19.2 kBTU/SF
    c. Site EUI: 85 kBTU/SF
    d. Floor Area: 270,000 SF
2) Building Final Performance Standard was assigned by occupancy type. The ZNC target was used for this example:
    a. Office ZNC Target: 53.4 kBTU/SF Site EUI
3) Interim Performance Standard Targets 1 and 2 were calculated as 1/3 and 2/3 between current site EUI and final standard
    a. Interim Performance Standard 1: 74.5 kBTU/SF
    b. Interim Performance Standard 2: 64 kBTU/SF
4) Electrification site EUI ratio was calculated per occupancy type using this calculation, which is the weighted average of the electrification ratios for each end use in the building, weighted by the estimated energy use of each end use for the occupancy type[47]:
    a. (ZNC elec EUI – elec_EE EUI) / gas_EE EUI)
    b. =53.4-53.1 / 0.3 = 0.89
5) The building's gas EUI and electricity EUI were both higher than the Energy Efficiency thresholds, so energy efficiency work is modeled to be done to meet the target.
6) For Interim Performance Standard 1:
    a. Electricity use was reduced by 3.5 kBTU/SF through energy efficiency.
        i. The building was able to reduce electricity use by 1/3 of the way toward reaching the EE threshold, but there was gas EE work that could also be done, so some electricity work took place.
    b. Gas use was reduced by 7 kBTU/SF through energy efficiency.
        i. The building was able to reduce gas use to make up the rest of the way to the target without going below the gas EE threshold
    c. Resulting EUI was 85 – 7 – 3.5 = 74.5 kBTU/SF and the building met the Interim Performance Standard 1 standard.
    d. Using the occupancy type specific capital costs for different end uses on a $/kBTU savings basis, costs to meet each target are estimated as:
        i. 3.5kBTU/SF of electricity energy efficiency work * $0.30/kBTU = $1.05/SF = $280,000
        ii. 7kBTU/SF of gas energy efficiency work * $0.64/kBTU = $4.54/SF = $1,230,000
7) For Interim Performance Standard 2, repeated step 6 using the Interim Performance Standard 1 result as the new baseline energy use

[47] Elec_EE EUI and gas_EE EUI are the electricity and gas components of the EE target, as calculated in the CNCA tool. These EUIs are used to compare an individual building's electricity and gas use to the assumed optimal efficiency EUI in each energy type. Achieving a gas EUI lower than the gas_EE EUI in a building would likely require some form of electrification.

8) For Final Performance Standard, repeated step 6 using the Interim Performance Standard 2 result as the new baseline energy use
9) Electricity and gas EUI were multiplied by floor area to do countywide impact calculations in kBTU

Summarizing for Typologies and County

('Cohort time model calcs' tab)

Energy use

1) Energy use was summed by BEPS group (1 through 5).
2) Summed up electricity use by occupancy type in a column, gas use by occupancy type in another column.
3) Did the same for Interim and Final Performance Standard.
4) Assigned the year of the Interim and Final Performance Standards for each occupancy type.
5) The model is done in odd years instead of annually to halve the number of calculations necessary.
6) Every two years from 2021 to 2039, energy use for each occupancy type wouldn't change until a target year is passed. After that target year, the total BTU changes to the modeled post-retrofit number.
    a. Example: Office electricity use in 2021 is 4,368 Billion BTU (BBTU)
    b. Interim Performance Standard 1 is 2027, so office electricity use was 4,368 BBTU in 2021, 2023, and 2025. In 2027 it changed to 4,201 BBTU as the new sum of all the Office buildings at Interim Performance Standard 1.
7) Gas calculations were done the same way. Gas use for offices was 512 BBTU in 2021, 2023, 2025. In 2027 it changed to 290 BBTU once Interim Performance Standard 1 date was passed.
8) After the Final Performance Standard was reached, energy use stayed constant for occupancy type and energy type.

GHG

1) GHG for each occupancy type was calculated by multiplying elec BTU * elec GHGI and gas BTU*gasGHGI
2) Gas GHGI was constant, meaning that gas won't have lower emissions intensity in the future.
3) Elec GHGI started at the value used in the GHG inventory (this is a customizable variable in the tool) and decreased linearly toward the carbon-free value by the year given in the user input (2035 to align with the clean electricity supply plans in the CAP).

Cumulative GHG

1) At each year, the total GHG from all typologies is added up for the countywide total with the policy
2) To estimate business as usual buildings with an improving grid, the starting year total BTU is multiplied by the GHGI for gas and electricity as it changes year to year.
3) Cumulative GHG adds up all BAU years' GHG and subtracts all Policy model years' GHG
    a. Multiply by two since the analysis is only done on odd years

A basic capital cost assumption was assigned to each energy end use to model the cost of energy efficiency and electrification. Table 21 shows the cost assumptions used in the model.

Table 21. Capital cost assumptions for gas and electricity end uses.

Policy Model Capital Cost Assumptions [$/kBTU of affected energy use]	Space heating	Water heating	Cooking	Other
Gas efficiency: cost for gas system optimization[48]	$0.18	$0.18	$0.76	$0.64
Gas electrification: cost for electrifying gas systems[49]	$1.03	$0.23	$0.72	$0.60

	Multifamily	Office	Lodging
Electricity efficiency: average cost for various electricity efficiency measures[50]	$0.25	$0.30	$0.11

The above assumptions are applied to each building in the model to arrive at total capital costs for retrofits. As an example of the results, Table 22 on the following page shows the costs of meeting the ZNC target for the median energy user in each building type. These costs were developed with many large assumptions around estimated energy end use breakdowns (e.g. how much gas is used for heating vs water heating or laundry) in all buildings, scalability of costs, and owner retrofit decisions as described above.

[48] Gas energy efficiency costs are sourced from SWA implementation work for measures such as system balancing, thermostats, air sealing, and low flow water fixtures. Cooking and laundry costs come from one-time appliance upgrade costs.
[49] Gas electrification costs are sourced from the CNCA tool, 'Electrification of Gas End Uses' tab.
[50] Electricity energy efficiency costs are sourced from case study work done in Washington DC in 2020 and 2021.

Table 22. Capital Costs for Median Buildings in Each Occupancy Group, used in the countywide policy impact model. The values in Table 17 are multiplied by the end use energy intensity of each building type to arrive at these estimates.

	Gas EE	Gas Electrification	Electric Efficiency
Building / Occupancy Type	$/Gas_kBTU	$/Gas_kBTU	$/Elec_kBTU
MF-New-Tall	$0.25	$0.29	$0.25
MF-Old-Tall	$0.22	$0.58	$0.25
MF-Short	$0.23	$0.56	$0.25
Higher Education	$0.30	$0.75	$0.30
Food sales	$0.48	$0.81	$0.30
Food service	$0.57	$0.65	$0.30
Health care Inpatient	$0.36	$0.67	$0.30
Health care Outpatient	$0.18	$0.23	$0.30
Lodging	$0.25	$0.45	$0.11
Mercantile Enclosed and strip malls	$0.42	$0.65	$0.30
Mercantile Retail (other than mall)	$0.35	$0.84	$0.30
Office	$0.64	$0.60	$0.30
Other	$0.18	$0.97	$0.30
Public assembly	$0.35	$0.86	$0.30
Public order and safety	$0.23	$0.58	$0.30
Religious worship	$0.34	$0.95	$0.30
Service	$0.18	$0.70	$0.30
Warehouse and storage	$0.51	$0.49	$0.30
Vacant	$0.18	$0.92	$0.30
Education – K-12 School	$0.30	$0.75	$0.04

APPENDIX IV – IMPACT OF TRAJECTORY TARGETS

This technical analysis included a brief discussion of how interim targets can be set for each building. The information below documents that discussion with preliminary modeling information using the ZNC threshold as the final year target. While some parts of the modeling methodology changed since this discussion, the considerations discussed remain valid.

- Trajectory Model
  i. Cycle 1 of 3: site energy use is lowered by 1/3 of the amount between 2019 and the final performance standard
  ii. Cycle 2 of 3: site energy use is lowered by 2/3 of the amount between 2019 and the final performance standard
  iii. Cycle 3 of 3: site energy use is lowered to the final performance standard
- Threshold Model
  iv. Cycle 1 of 3: site energy use is lowered to the 75th percentile (variable) for the group. For buildings below the threshold, no action is needed
  v. Cycle 2 of 3: site energy use is lowered to the 50th percentile (variable) for the group. For buildings below the threshold, no action is needed
  vi. Cycle 3 of 3: site energy use is lowered to the final performance standard

The following charts show examples – using an earlier version of the covered buildings list – of the start, interim and the final performance standard. The first chart is for the whole county of covered buildings. The second is for all “Mercantile Retail (other than mall)”. The third is for “MF-New-Tall” subject to a common multifamily target. Across all three, the number of buildings affected by the trajectory model is the same for each compliance cycle (2027, 2031, 2035, for example), while the threshold model has fewer buildings in the earlier compliance cycles as the buildings below the thresholds do not need to perform retrofits.

Using this earlier building count, approximately 22% of parcels countywide (1353 – 1054 = 299 parcels) would not need to take action to meet their respective final performance standard. These buildings already have a site EUI below the final performance standard for their group.

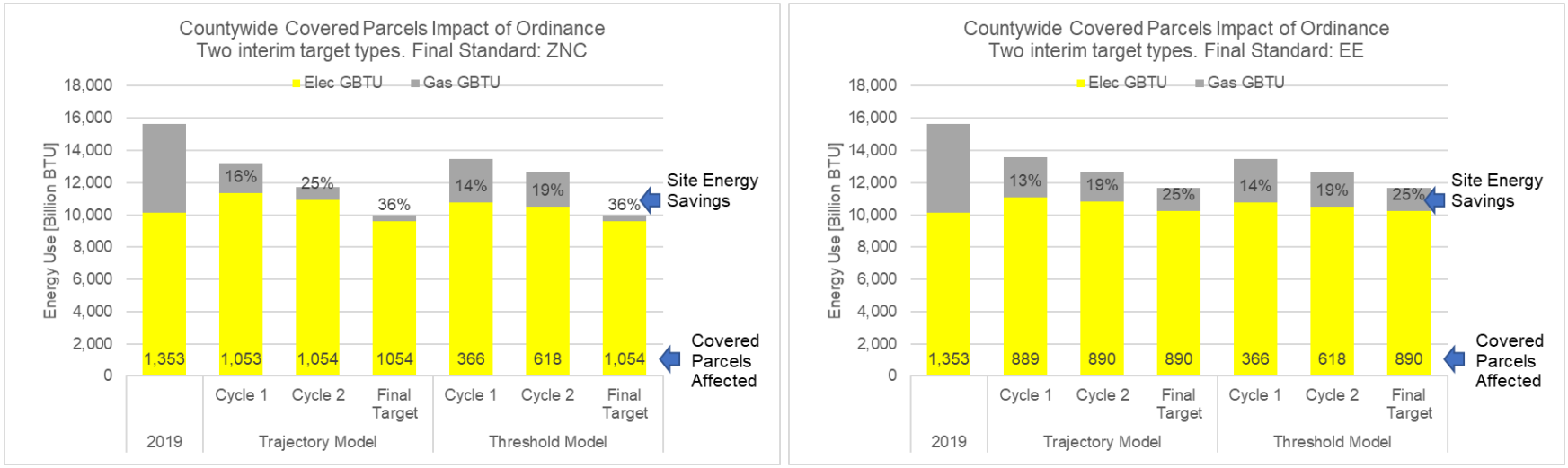

Figure 35. Countywide impact of standards set to two different final year targets: ZNC (left) and EE (right)

APPENDIX V – BUILDING COST – BENEFIT CASE STUDY DETAILS

To test the viability of the targets, the analysis team chose nine building examples in Montgomery County and developed multiple retrofit packages. Each building was assigned a target using the proposed methodology, and a package of energy-reducing measures was created. The technical viability and economics of reaching the targets confirmed that, at least for the types of buildings exemplified in this technical analysis, the targets are reachable. High-level findings are contained in the "Building Cost-Benefit Case Study" section of this report.

Methodology

Selection of Case Study Buildings

The analysis team reviewed proposed covered building types in *Appendix I - Recommendations for Building Groups* and *Appendix II - Montgomery County Energy Use Distributions Overview* to identify typologies with common characteristics and a variety of starting points (mechanical systems, space use type and building layout). Common building types include:

- Commercial offices
- Multifamily buildings
- Lodging: hotels and other hospitality
- Mixed use spaces
- Retail

Because of the prevalence and diversity of office, multifamily, and hospitality buildings, the team evaluated multiple buildings within each typology. Offices were further divided into newer, class-A type offices, older mixed-fuel offices (i.e., office spaces that use both electricity and natural gas), and older all-electric offices. Multifamily buildings were further divided into newer, high-rise mixed-use buildings, older high-rise affordable housing buildings, and garden-style multifamily buildings.

Other spaces considered include different types of lodging with or without a significant amount of amenities, and a multi-function building that serves multiple end uses—for example, a building with both worship and school space.

The team reached out to many building owners seeking participants for this technical analysis and to conduct interviews. Only respondent buildings are included in the technical analysis, which limits building inclusion and eliminated the retail group, which had no respondents able to participate in the case study exercise.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to

desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Building Descriptions

Square Footage Calculations

Square footage figures are presented to comply with ENERGY STAR Portfolio Manager guidance. In some cases, the square footage breakdown or totals may differ from 2019 benchmarking data reported to the County. In these cases, the reported figures were adjusted in conjunction with the building representatives to follow Portfolio Manager guidance on benchmarking space use types.

Portfolio Manager Property Type Breakdowns / Guidance

To determine the appropriate site EUI target for each building, individual space use types and square footages needed to be identified. Targets for a total site use a blended site EUI target for each primary space type as a weighted average based on the square footage of each space. The methodology used in this technical analysis follows the Montgomery County benchmarking methodology which in turn relies on Portfolio Manager guidance. See *Appendix XI – Space Type Definition Guidance from EPA Portfolio Manager* for detail on how occupancy types were defined in this technical analysis.

Building System Information

Key building mechanical systems and envelope information were inventoried for each building. Equipment age from interviews, nameplate data, or building drawings is included where available.

End of Useful Life Assumptions

End of Useful Life (EUL) assumptions are included for major equipment. Estimates are derived from the *ASHRAE Equipment Life Expectancy Chart* and the *BOMA Preventative Maintenance Guidebook.*

EUL is the point at which it is no longer economically or physically feasible to continue the use of a piece of equipment or a system. Equipment upgrades are most cost effective at the EUL. Replacement of equipment prior to the end of its useful life will mean incurring replacement costs when existing equipment can still serve the building.

Since system replacement is part of the cost of operating a building, only the difference between in-kind-replacement equipment and an energy efficient upgrade (known as the incremental cost) should be weighed at EUL. Paybacks and returns on investment are more attractive when considering incremental cost rather than full project costs, so building owners should plan around EUL when a required replacement cost is already assumed.

For the purposes of this technical analysis, incremental costs were not calculated. Full project costs that include both soft costs (i.e., design) and hard costs (i.e., installation) were used in this report.

Utility End Use Assessment

Utility data for the case study buildings is sourced from the Montgomery County benchmarking compliance data for each of the case study buildings. Energy use information may differ from the benchmarking submission if any needed corrections were identified through this review. For example, if some energy use data was not included in a benchmarking submission (e.g., tenant or retail use), it was added in for this analysis in conjunction with the building representatives since the BEPS law would consider whole building energy data.

This utility data includes all house/primary utility accounts, tenant, and secondary space usage. Electricity kilowatt hours (kWh) and gas therms are converted into thousands of British Thermal Units (kBTU). Other fuel types such as fuel oil (e.g., propane, diesel) were not included in this analysis. The case study buildings did not use these fuel types in day-to-day operation, although they may use these loads in emergency conditions (e.g., generators).

Using this utility data, an end-use breakdown assessment is conducted for each building using 2019 monthly data. This breakdown assessment is done for each fuel type in order to identify major end uses such as heating load, cooling load, or domestic hot water (DHW) load. These end uses were estimated as described below, then organized by fuel type. Each end use is represented as a portion of site EUI.

Weather-Dependent End Uses

Weather-dependent (heating and cooling) end uses were first estimated by a regression analysis. Daily average temperature data was gathered from the US National Oceanic and Atmospheric Administration public data set. Changes in energy usage were compared in relation to changes in heating degree days (HDD) and cooling degree days (CDD), calculated from Ronald Reagan National Airport (DCA) weather data. Weather data from DCA is reliable, complete, and regularly used for analysis in Montgomery County as the ambient conditions are similar enough to represent a reasonable estimate of Montgomery County weather usage.

HDD and CDD were based on a base temperature of 65ºF. Average kilowatt hour (kWh) or therm usage per HDD or CDD was then applied to a ten-year average of temperatures to estimate an average, hypothetical year of energy usage, rather than just a single year of data. The following totals were used:

Table 23. 2019 Total Heating Degree Days (HDD) and Cooling Degree Days (CDD)

Month Start	Month End	Days	HDD	CDD
1/1/2019	2/1/2019	31	893	-
2/1/2019	3/1/2019	28	651	-
3/1/2019	4/1/2019	31	574	3
4/1/2019	5/1/2019	30	123	28
5/1/2019	6/1/2019	31	29	191
6/1/2019	7/1/2019	30	-	327
7/1/2019	8/1/2019	31	-	510
8/1/2019	9/1/2019	31	-	437
9/1/2019	10/1/2019	30	-	319
10/1/2019	11/1/2019	31	114	59
11/1/2019	12/1/2019	30	581	-
12/1/2019	1/1/2020	31	723	-
Totals		**365**	**3,688**	**1,874**

For example, in a building known to use gas for both heating and domestic hot water (DHW), increases in gas usage accompanying increases in HDD is associated with heating. In a building known to use gas for only DHW, all gas consumption regardless of changes in outdoor temperature is associated with water heating.

The calculated heating and cooling use for each building was compared to national building end use averages taken from the 2012 dataset (the most recent year available) of the United States Energy Information Administration Commercial Buildings Energy Consumption Survey (CBECS) as a reference dataset used by Portfolio Manager for typical building energy uses. The comparison can provide insight where calculated heating and cooling use is very different from CBECS averages, indicating the need to look deeper at the building's weather dependent versus independent energy use profile.

The analysis team also compared the calculated heating and cooling use to assumptions on Montgomery County building end uses compiled from methodology in the CNCA EBPS tool[51]. The CNCA calculations adjust national building end use averages taken from CBECS to Montgomery County's climate and building energy data, giving typical heating and cooling energy use intensity by typology. These values were used in some cases where actual building data was unreliable, incomplete, or lacked granularity.

Non-Weather-Dependent End Uses

The values in the CBECS data were used as a check against the regression analysis and to better estimate non-weather-dependent end uses such as cooking and DHW. Non-weather-dependent end uses are difficult to separate via weather-based regression methods, making supplemental resources such as CBECS useful for estimating these end loads. CBECS data was also used to estimate some weather-dependent end uses where the regression analysis results were not able to clearly separate end uses.

End Use Descriptions

Building energy usage is organized into energy use intensity (EUI) defined as total building energy usage divided by total building square footage (kBTU/SF). These data are inclusive of all house/ master accounts, tenant, and secondary space usage. Electricity kWh and gas therms are converted into kBTU.

Gas

- Heating: Gas used for heating boilers or furnaces. Also includes usage attributed to heating air for central conditioned air supply systems.
- Cooling: Gas used for fossil-fuel fired chillers. No reviewed buildings contained these systems.
- Domestic Hot Water (DHW): Gas attributed to heating boilers which also supply DHW, or for dedicated water heaters, whether centralized or individual units within tenant spaces.
- Baseload: Gas usage not assigned to the above categories; in most cases this takes the form of cooking.

Electricity

- Heating: Electricity used to generate space heating, associated with heat pump, split systems, and central ventilation units for conditioning supply air. Electricity assigned to heating will also appear in some buildings with central gas-fired equipment when electricity is used for distribution and other equipment. For example, buildings with baseboard heaters supplementing central gas-fired hot water boilers will see electrical use attributed to these baseboard heaters.
- Cooling: Electricity use for air conditioning, applies to all central systems such as electric chillers and cooling towers, as well as unitized air conditioners and heat pumps.
- DHW: Electricity used for DHW production, either through central or unitized DHW tanks.
- Baseload: Electricity usage not assigned to the above categories, includes lighting, ventilation fans, tenant plug loads, cooking where applicable, and other process loads such as elevators. This usage also includes baseload HVAC energy use like fans and pumps that run throughout the year, regardless of weather.
    - Commercial lighting estimates reflect primarily fluorescent lighting; lighting EUI for buildings with LED lighting are reduced by 5%-10% based on the amount of LEDs installed at the building as determined via interviews.
    - Estimates for lighting for multifamily buildings are included. Information is based on the 2015 dataset of the United States Energy Information Administration Residential Energy Consumption Survey (RECS); lighting EUI for buildings with LED lighting are reduced by 5%-10% based on the amount of LEDs installed at the building as determined via interviews.

[51] Supra 11.

Case Study Energy Efficiency Measure Calculations

Energy savings resulting from applying various energy efficiency measures (EEMs) are calculated for each of the case study buildings. An EEM is a building upgrade measure that generates energy savings. All energy savings calculations are shown in percent reduction of site EUI.

Measure savings are calculated to be interactive when organized into packages. For this technical analysis, load reduction measures were estimated first, followed by equipment upgrades that are intended to improve upon the reduced load. Except where noted, additional measures that achieve energy savings beyond targeted goals are excluded to minimize costs, even if applicable to the building.

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.[52]

Each measure's simple payback (SP) is developed based on the expected capital outlay associated with *just the cost of that measure*. Simple Payback is calculated by dividing the total project cost by the energy cost savings per year. In practice, other items may factor into an "effective" SP calculation but are outside the immediate scope of this report. These items include, but are not limited to:

- Replacement costs for aged, existing equipment. Where possible, the approximate equipment age of equipment being replaced was called out at the case study level.
- Potential capital outlay offsets, such as utility incentives
- Effective methods for deferring capital outlay, such as financing

Each measure's return on investment (ROI) is determined by taking the energy cost savings per year divided by the total cost and converting this number to a percentage. Calculating an "effective" ROI is outside the scope of this report for the same reasons as calculating an "effective" SP.

Separately, a table of EEM descriptions, relevant performance standards, cost/savings assumptions, and informational references to assist in creating the proposed EEM packages for each building are included in the *BEPS EEM Matrix* Excel document provided with this report. The document contains EEMs used in this technical analysis, as well as EEMs not recommended for these specific buildings. The data in the *BEPS EEM Matrix* informed the costs and savings for measures in the case studies except where site-specific recommendations are required.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

[52] Montgomery County, Maryland Division of Treasury – Excise Tax Unit. "Public Utility Fuel-Energy Tax Return." https://www.montgomerycountymd.gov/Finance/Resources/Files/FY2021Utility%20Return.pdf

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 24 below.

Table 24: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[53].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited

[53] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low-cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five-year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Technical Considerations

Where applicable, the following guidelines for the case studies were applied:

- In buildings with tenant spaces, the level of intrusiveness and invasiveness was qualitatively weighed against energy savings benefits to determine if a measure was feasible to implement. In some cases, entry to tenant spaces is required to complete measures that save enough to get to the energy performance targets, but in others, the balance of other applicable measures can achieve the same goal without as much disruption to tenants.
- When building systems were fully replaced in the ZNC Target Package, the ZNC Target Package did not include measures that modify existing building systems.

- When building system types were changed in the ZNC Target Package, this was assumed to happen at the end of equipment life. Most equipment in the case study buildings would need to be replaced between now and 2035.
- Existing mechanical systems were not substantially modified for the Less-than-Five-Year Payback Package.
- Envelope measures including exterior wall insulation retrofits and window replacement are labor intensive, carry a high cost, can have long paybacks, and are often difficult to implement in an occupied building. These measures were generally excluded from the case studies unless determined to be absolutely necessary to meet the ZNC package. Depending on technology advancements between now and 2035, these measures may not be necessary in the future.

Baseline Assumptions

Standard baseline assumptions were used for existing building equipment for consistency in calculations, unless noted otherwise:

- Gas-fired boilers and hot water heaters: 82% efficient
- Gas-fired furnaces: 80% efficient
- Electric resistance heaters and hot water heaters: 100% efficient
- Heat Pump Water Heaters: Annual average 2.2 COP
- Space heating air source heat pumps: Annual average 2.5 COP

Retro-commissioning

Retro-commissioning (RCx) is the process of ensuring systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. It is a crucial process for maintaining existing building performance and is generally recognized as the first stage in the building upgrade process. Starting a staged upgrade approach with RCx accounts for interaction among energy flows within a building and ensures a systematic method to target the greatest possible energy savings. This process is always site-specific but is an effective real-world intervention.

Because the RCx scope of work can vary widely depending on the needs of a building and available budget, industry research estimates whole building energy savings can range widely from 5% to 30%, making precise estimates difficult.

As noted above, retro-commissioning was typically one of the first applied measures in the Less-than-Five-Year Payback Package. The savings percentage applied varied somewhat by building type based upon results from occupant interviews. The following guidelines applied:

- Buildings where the existing building automation system (BAS) had more visibility into terminal equipment had a higher percentage savings.
- Buildings with older equipment had a higher percentage savings estimated than buildings with newer equipment.
- In buildings where *other* terminal upgrades occurred (for example, Guest Room Controls in lodging building types), retro-commissioning measures applied *only* to central equipment.
- For some buildings, RCx was not recommended because of equipment layout (decentralized systems) or because major equipment was being replaced and would not be subject to RCx.

Solar PV Estimates

Estimates for solar photovoltaic (PV) system installation were derived from the NREL PVWatts® Calculator (https://pvwatts.nrel.gov/). Solar PV systems use solar energy to generate electricity.

The following parameters were used in the tool:

- Module Type: Premium

- Array Type: Fixed (roof mount)
- Soiling: 0%
- Tilt:10 degrees

PVWatts makes basic assumptions on permissible roof area, however site-specific inspections are required to determine accurate capacity based on building code and regress requirements.

Solar PV cost savings calculations are based purely on generated energy savings. Other financial incentives such as tax benefits or the sale of solar renewable energy certificates (SRECs) were not included in solar PV financials. SRECs are certificates generated for each megawatt-hour of electricity generated from solar PV that can be sold on an open market to offset the capital cost of a PV system.

Financial & Cost Calculations

Cost information for case study EEMs was derived from SWA industry research, RSMeans data, and interviews with case study properties owners and managers.

Estimated costs were intended to be inclusive of the total cost to complete the project (e.g., engineering, design, equipment and materials, associated work related to equipment installation, and labor). Soft costs for engineering, design, and other considerations were not explicitly itemized as part of the cost estimates. These fees were assumed to be a relatively small percentage of the overall capital cost for whole-building upgrades and generally captured in the cost estimates referenced here from research studies and other case study examples.

These estimated costs are absolute figures. They do not consider other factors that may make financial performance more appealing, including the following:

- Sunk costs for equipment replacement at the EUL
- Utility incentives
- Tax credits or depreciation policies
- Financing through entities such as the Montgomery County Green Bank
- Fines resulting from non-compliance with BEPS, and future liability from approaches that may not comply with potential carbon reduction and electrification requirements.
- Labor cost savings from new equipment (e.g., reduced maintenance, value of tenant comfort)

Each EEM’s simple payback – measured by simple payback (SP) – was determined after identifying measures applicable to the building. This was calculated by dividing total measure cost by the measure’s annual dollar savings.

Each EEM’s return on investment, or ROI, was determined by dividing the annual dollar savings by total measure cost and converting to a percentage.

Case Study 1: Class-A Office

Building Information

This Class A office building in Montgomery County has a restaurant on the first floor. An adjacent parking garage can be used by tenants and visitors to the restaurant. Most of the non-restaurant space is comprised of typical office space (e.g., offices, conference rooms, and ancillary support areas like pantries).

This building was approximately 40% unoccupied based on 2019 data. The impacts of vacancy on targets are discussed more within *Recommendations for Adjustments based on Occupancy*. This case study target is based upon the methodology currently available to Montgomery County.

Table 25. Building Characteristics – Case Study 1

Category	Building Information
Typology	Office
Square Footage	200,000 ft.^{2} – 225,000 ft.^{2} Office: 100% Parking: 150,000 ft.^{2} – 175,000 ft.^{2} (on premises but does not factor into conditioned square footage)
Year Built Range	2005 – 2010
2019 ENERGY STAR Score	60 – 65
2019 Site EUI (kBTU/SF) (calculated for this study)	70 – 80

Building System Information

The basic building system information specific to the case study building is described below.

Table 26. Building System Information – Case Study 1

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	Building automation system controls mechanical equipment	Electric	13	<5
Heating	Distributed electric VAV heaters	Electric	13	10-15
Cooling	2x chillers (in series) w/free cooling HX	Electric	13	10-15
Ventilation	Floor-by-floor AHUs with an ERV. VAV terminal units	Electric	13	10-15
DHW	Distributed electric water heaters	Electric	13	5-10
Lighting	Mostly converted to LED	Electric	5-10	5-10
Envelope	Original to the building	N/A	13	30-35
Metering	Two main electric meters plus a gas meter for the restaurant	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end use is displayed below.

- Gas: exclusively used in the restaurant space, totaling 18% of the building's energy use.
- Electricity: used for heating, cooling, ventilation, lighting, and electric plug loads. In total, electricity is 82% of the building's energy use.

Table 27. 2019 Site EUI by End Use – Case Study 1. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Lighting – Electric	Baseload – Electric	Total EUI
0%	0%	0%	18%	17%	10%	0%	43%	12%	**100%**

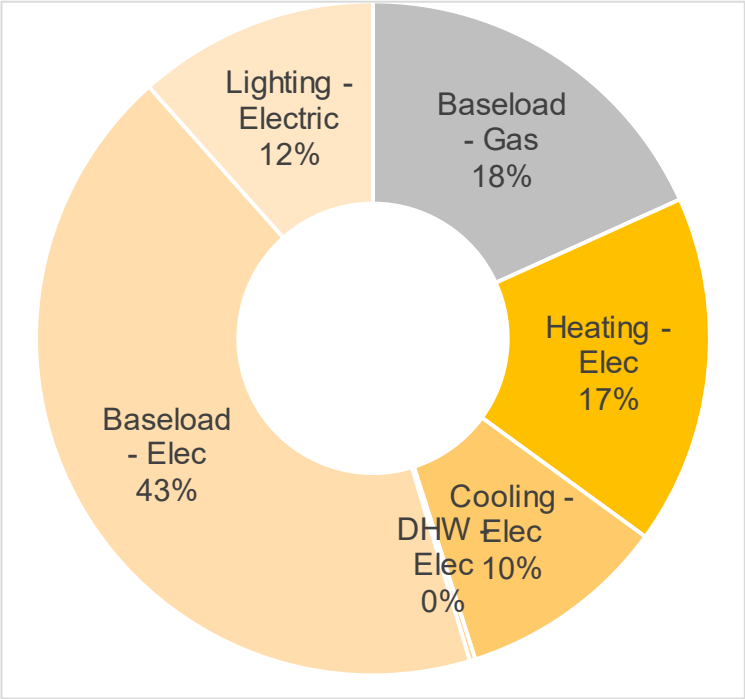

Figure 36. Site EUI Share (%) by End Use – Case Study 1

Target Determination

Total site EUI targets for the building are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. Table 28 contains a breakdown of the space use targets for purposes of calculating the ZNC target. Other building uses are discussed below this table.

A relatively small restaurant is located within the building (less than 5% of the overall floor area). Because this space does not make up more than 25% of the floor area, it does not factor into this building's target calculation. The floor area is instead added to the Office space per EPA ENERGY STAR guidance. The restaurant is the only space that uses gas.

Note that the floor areas shown in the table below are approximated based on Table 26.

All the following analysis uses the ZNC target. The table also has an alternate target ("EE Standard"), which is no different than the ZNC Target for this building. The building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 28. Space Use Target Methodology Summary – Case Study 1

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (EE * Area%)
Office	Office	100%	225,000	53.4	53.4	53.4	53.4
Total	**-**	**100%**	**225,000**	**-**	**-**	**53.4**	**53.4**

A significant portion of this building is listed as vacant office space based on Portfolio Manager data. While an eventual useful end goal of separating vacant space from occupied space should be pursued (see *Site EUI Target Adjustment Factors*), for case study purposes, the analysis team assumed the initial ZNC target would have to be set based upon information available to Montgomery County today.

The baseline site EUI is derived from whole building 2019 utility data over whole building square footage.

Table 29. ZNC and Interim Targets – Case Study 1

EUI Description	ZNC Target	EE Target
Baseline EUI	70 – 80	70 – 80
2026 – Interim Target 1	63 – 72	63 – 72
2030 – Interim Target 2	57 – 64	57 – 64
2035 – Target	53.4	53.4

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *Less-than-Five-Year Payback Package* is based on the results of a package that have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax breaks.

An EE Target Package was not developed for this building as the ZNC Target is identical to the EE Target.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 30. EEM Package Summary – Case Study 1

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	49 – 53	30%	$150,400	$5,280,000	35.1	3%
Less-than-Five-Year Payback Package	67 – 75	8%	$47,300	$95,00	2.0	49%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 31 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 31. ZNC Target Package EEMs – Case Study 1. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Convert to VRF System	Convert the mechanical system to a VRF system	7.2%	$43,900	$4,682,000	106.6	1%	15	10
2	Electrify Cooking	Convert gas cooking to electric cooking	7.7%	$16,100	$24,000	1.5	66%	15	N/A
3	Retro-commissioning	Retro-commission and implement improvements on building systems	6.8%	$41,400	$74,000	1.8	56%	5	5-10
4	Plug Load Management	Install smart plug load management tools	1.6%	$9,700	$38,000	3.9	25%	10	DNE
5	Solar PV	Install roof-mounted solar PV	6.5%	$39,300	$462,000	11.7	9%	15	DNE
Total			**29.8%**	**$150,400**	**$5,280,000**	**35.1**	**3%**	**-**	

Table 32. Post Retrofit Percent Reductions from Baseline for ZNC Target Package – Case Study 1

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	0%	0%	0%	18%	17%	10%	0%	43%	12%	**100%**
End Use Difference	0%	0%	0%	-100%	-69%	51%	-8%	-10%	-8%	**70%**

EE Target Package

This typology has the same ZNC target as EE target; therefore, there is no separate EE target package for this building. The ZNC target package in Table 31 would also serve as an EE target package.

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback Package allows the building to reach its first interim target threshold.

Table 33. Less-than-Five-Year Payback Package EEMs – Case Study 1. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Retro-Commissioning	Retro-commission and implement improvements on building systems	6.5%	$39,800	$74,000	1.9	53%	5
2	Plug Load Management	Install smart plug load management tools	1.2%	$7,500	$21,000	2.8	35%	10
	Total		**7.8%**	**$47,300**	**$95,000**	**2.0**	**49%**	**-**

Table 34. Post Retrofit Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 1

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	0%	0%	0%	18%	17%	10%	0%	43%	12%	**100%**
End Use Difference	0%	0%	0%	0%	-8%	-8%	-8%	-11%	-8%	**92%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

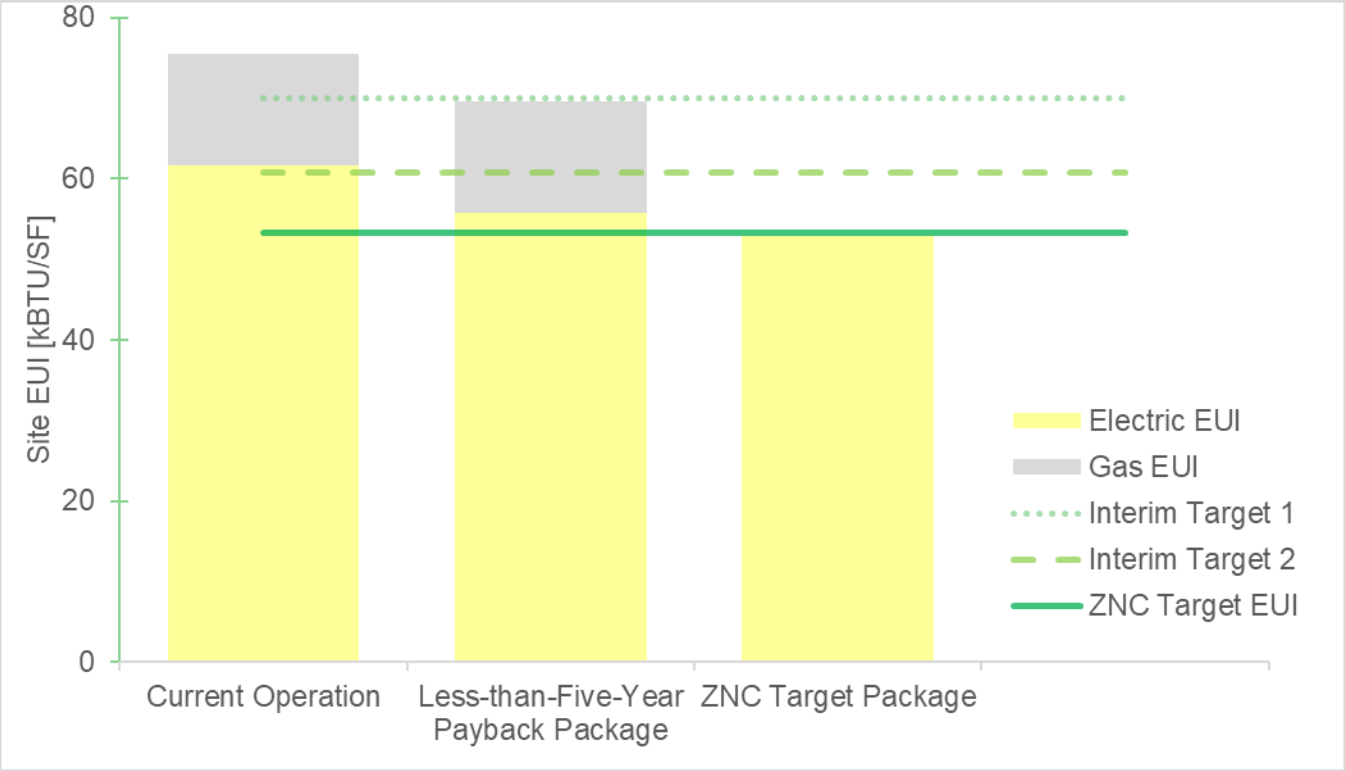

Figure 37. Target-to-Package Comparisons – Case Study 1

The Less-than-Five-Year Payback Package clears the first interim target but leaves the building well short of the ZNC Target.

Building-Specific Technology Assessment

Electric heating is rather inefficient compared to other heat pump technology (for example, either WSHP or VRF systems). Improving heating efficiency represented the best opportunity to reach the ZNC target.

A WSHP conversion would maintain some of the existing piping through the core of the office building; new water piping would need to be run throughout the building perimeter. In addition, the pumping system would be maintained. A VRF conversion would also be intrusive in terms of refrigerant piping; however, the pumping energy required for refrigerant is much less than the pumping energy required for water. This reduction in pumping energy made the energy savings of VRF more attractive than WSHP.

Gas is not used in office spaces at this building. As a result, electrification of the restaurant loads represents the only effective way to eliminate gas usage.

Following these system upgrades, other measures affecting building demand were chosen, such as plug load management. These measures do not have a large overall impact on savings and were generally non-interactive in nature meaning savings from these measures do not appreciably increase or decrease savings from other measures.

Lastly, solar PV is applied to the roof only. Other approaches to solar PV such as canopied PV over the adjacent parking garage or empty lot next door increase the amount of PV and may be a more attractive financial approach than the ZNC Target Package.

The Less-than-Five-Year Payback Package was constructed using nearly the same measures as the ZNC Target Package, with the exception of system conversion, restaurant electrification and solar PV.

This building has substantial unoccupied space which makes the ZNC target easier to reach. The section *Recommendations for Adjustments based on Occupancy* describes possible adjustments to this building (and similar building types with substantial vacancy) which may in turn impact the actual measures chosen.

Package Comparisons

The existing system can be optimized to meet the ZNC target. However, system conversion should be investigated when the existing chilled water system reaches the end of its life, as another type of system could provide greater efficiency.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital cost may be effectively defrayed by subtracting avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be effectively set aside to help cover part of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. Funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.
- Advances in technology between now and the ZNC target date may result in viable alternative approaches, meaning reduction in the ZNC costs and payback ranges described.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- DHW: domestic hot water is a minimal load in office buildings and was not examined.
- Envelope: Re-roofing was considered but ultimately determined as non-cost effective and not necessary to meet the ZNC target. The remaining envelope items should still be functional and effective in 2035.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Two packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
  - Electrified end uses were typically large (i.e., all of a building's heating loads), and
  - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package (Not Applicable for this Case Study)

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 35 below.

Table 35: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[54].

[54] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 2: Older Mixed Fuel Office

Building Information

The building was constructed in the 1970s, and most mechanical equipment has been replaced once since original construction. The building is heated and cooled by water source heat pumps (WSHPs) connected to a condenser water loop, with a central boiler and cooling tower to provide heat and heat rejection, respectively, for this system. Onsite parking is available.

The ground floor of this building has retail and restaurants, which in total make up less than five percent of the overall floor area. These tenants generally have their own mechanical systems and meters.

Table 36. Building Characteristics – Case Study 2

Category	Building Information
Typology	Office
Floor Area	Total: 250,000 ft.^{2} – 275,000 ft.^{2} Office: 50% Medical Office: 50% Parking: 50,000 ft.^{2} -75,000 ft.^{2} (on premises but does not factor into conditioned square footage)
Year Built	1970-1975
2019 ENERGY STAR Score	40 – 45
2019 Site EUI (kBTU/SF) (calculated for this study)	80 – 90

Building System Information

The basic building system information specific to the case study building is described below.

Table 37. Building System Information – Case Study 2

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	Manages central plant/major equipment only. Perimeter heat pumps operated on stop/start only	Electric	Unknown (estimated 15 years)	Unknown (est. <5)
Heating	Distributed WSHPs with central boiler for heating	Gas	5	15-20
Cooling	Distributed WSHPs with cooling tower for heat rejection. Larger central WSHPs also provide fresh air.	Electric	9-14	5-10
Ventilation	No dedicated ventilation equipment. Outdoor air delivered via ventilation shaft to each mechanical room	Electric	N/A	N/A
DHW	Two electric DHW heaters	Electric	Unknown (estimated 10 years)	Unknown (est. 5-10)
Lighting	Mostly completed LED upgrades	Electric	0-2	5-10
Envelope	Brick with poured concrete exterior. Façade components are original, though the west side of the building has window tint.	N/A	50	5-10
Metering	Retail and restaurant spaces on separate meters	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end use is displayed below.

- Gas: used in the office space for space heating via the central boiler. The retail spaces, including the restaurant, also use gas. Gas makes up 21% of the building's site energy use.
- Electricity: used for heating and cooling (through WSHPs), ventilation, lighting, and electric plug loads. Electricity makes up 79% of the building's site energy use.

Table 38. 2019 Site EUI by End Use – Case Study 2. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Elec	Cooling – Elec	DHW – Elec	Baseload – Elec	Lighting – Elec	Total EUI
16%	0%	0%	4%	13%	8%	0%	47%	10%	**100%**

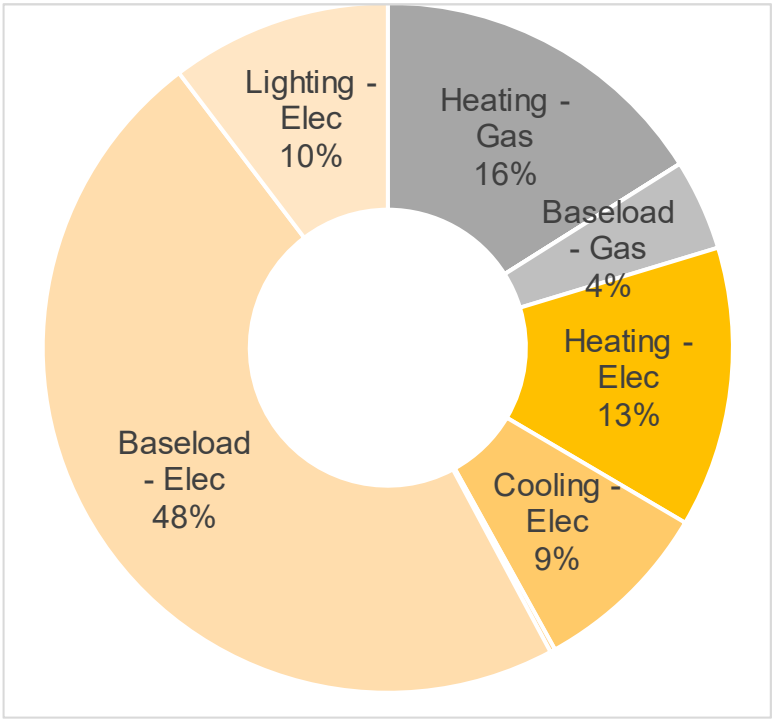

Figure 38. Site EUI Share (%) by End Use – Case Study 2

Target Determination

Site EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. Table 39 contains a breakdown of the space use targets for purposes of calculating the ZNC target. Other building uses are discussed below this table. The table also has an alternate target ("EE Standard"), which is no different than the ZNC Target for this building. The building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Note that the floor areas shown in the table below are approximated based on Table 37.

Table 39. Space Use Target Methodology Summary – Case Study 2

Specific Space Type	Space Type Group	Area %	Floor Areas (ft.^{2})	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (ZNC * Area%)
Office	Office	50%	125,000	53	53	26.7	26.7
Medical Office	Health Care Outpatient	50%	125,000	62	62	31.1	31.1
Total	**-**	**100%**	**250,000**	**-**		**57.8**	**57.8**

This building has restaurant and other retail spaces. These spaces are relatively small (less than 5% of the overall floor area). Because the ground floor retail spaces do not make up more than 25% of the floor area, these spaces' individual targets do not factor into this building's target calculation. These retail floor areas are instead spread evenly across the Office and Health Care Outpatient spaces.

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 40. ZNC and Interim Targets – Case Study 2

Target	ZNC Target	EE Target
Baseline EUI	80 – 90	80 – 90
2026 – Interim Target 1	71 – 80	71 – 80
2030 – Interim Target 2	62 – 70	62 – 70
2035 – ZNC Target	57.8	57.8

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

An EE Target Package was not developed for this building as the ZNC Target is identical to the EE Target.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 41. EEM Package Summary – Case Study 2

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	52 – 57	35%	$183,000	$4,832,000	26.4	4%
Less-than-Five-Year Payback Package	67 – 75	16%	$118,100	$476,000	4.0	25%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 42 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 42. ZNC Target Package EEMs – Case Study 2. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert the central boiler to an air-to-water heat pump	11.8%	$8,000	$3,730,000	466	0%	18	15-20
2	Electrify Restaurant	Convert gas cooking to electric cooking	1.7%	($10,500)	$12,000	N/A	N/A	10	Unknown (estimated 10 years)
3	Retro-commissioning	Retro-commission and implement improvements on central building systems	6.9%	$59,600	$95,000	1.6	63%	5	N/A
4	HVAC Schedule Adjustments	Adjust existing HVAC schedules to align with occupancy	6.6%	$57,000	$3,000	0.0	2,281%	5	N/A
5	Electric Submetering	Install submeters to incentivize tenants to reduce their energy use	1.0%	$8,800	$149,000	16.9	6%	10	DNE
6	Lighting Occupancy Presence Sensors	Install lighting sensors to sense occupants in offices	0.1%	$1,300	$59,000	46.7	2%	10	DNE
7	Daylighting Controls	Install daylighting sensors to turn off lights in perimeter spaces	0.2%	$1,900	$95,000	51.0	2%	10	DNE
8	Garage LED upgrade	Complete ongoing LED conversion for the parking garage	0.3%	$2,200	$48,000	21.7	5%	10	0-5
9	Plug Load Management	Install smart plug load management tools	1.3%	$11,500	$27,000	2.4	42%	10	DNE
10	Solar PV	Install roof-mounted solar PV	5.0%	$43,200	$614,000	14.2	7%	15	DNE
Total			**34.9%**	**$183,000**	**$4,832,000**	**26.4**	**4%**	**-**	

Table 43. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 2

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI (%)
Baseline	16%	0%	0%	4%	13%	8%	0%	47%	10%	**100%**
End Use Difference	-100%	0%	0%	-100%	1%	-24%	0%	-23%	-15%	**65%**

EE Target Package

This typology has the same ZNC target as EE target; therefore, there is no separate EE target package for this building. The ZNC target package in Table 42 would also serve as an EE target package.

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback Package allows the building to reach its first interim target threshold.

Table 44. Less-than-Five-Year Payback Package EEMs – Case Study 2. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Retro-commissioning	Retro-commission and implement improvements on central building systems	7.6%	$58,500	$95,000	1.6	62%	5
2	HVAC Schedule Adjustments	Adjust existing HVAC schedules to align with occupancy	5.5%	$34,100	$3,000	0.1	1,365%	5
3	Electric Submetering	Install submeters to incentivize tenants to reduce their energy use	1.0%	$8,500	$149,000	17.6	6%	10
4	Lighting Occupancy Presence Sensors	Install lighting sensors to sense occupants in offices	0.1%	$1,300	$59,000	46.1	2%	10
5	Daylighting Controls	Install daylighting sensors to turn off lights in perimeter spaces	0.2%	$1,900	$95,000	50.5	2%	10
6	Garage LED upgrade	Complete ongoing LED conversion for the parking garage	0.3%	$2,200	$48,000	21.7	5%	10
7	Plug Load Management	Install smart plug load management tools	1.3%	$11,600	$27,000	2.3	43%	10
	Total		**16.1%**	**$118,100**	**$476,000**	**4.0**	**25%**	**-**

Table 45. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 2

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	16%	0%	0%	4%	13%	8%	0%	47%	10%	**100%**
End Use Difference	-23%	0%	0%	0%	-24%	-24%	0%	-12%	-15%	**84%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

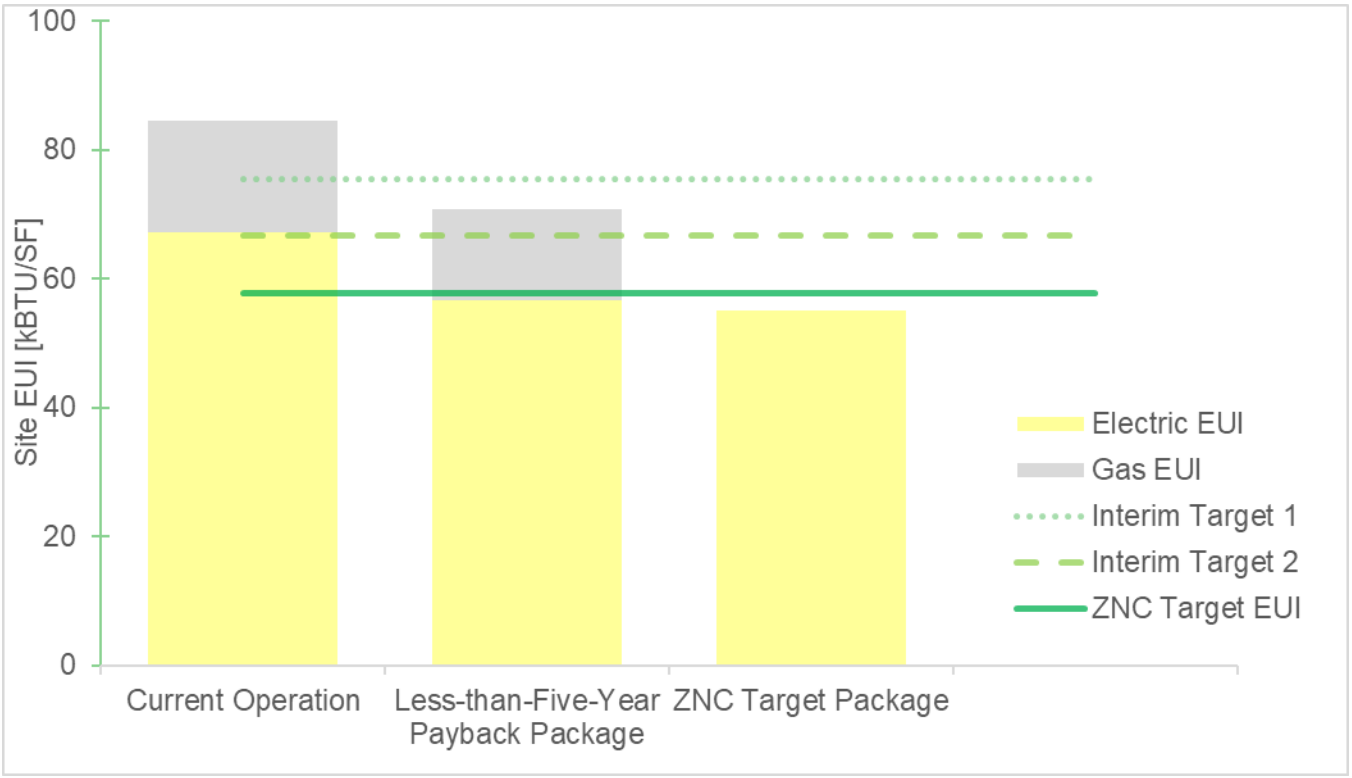

Figure 39. Target-to-Package Comparisons – Case Study 2

As seen in Figure 39, the Less-than-Five-Year Payback Package results in a savings amount below the first interim target. As discussed below, savings above and beyond the ZNC Target are certainly possible for this building.

Building-Specific Technology Assessment

When offices have a substantial gas load, it is typically for space heating. Given this, electrification for this building would consist of electrifying the boiler system by converting it to an air-to-water heat pump and then electrifying any of the smaller retail loads.

Once these improvements are completed, optimization of the remaining building systems can occur. These additional savings measures can be complicated to implement for a heat pump loop building, since most of the building efficiencies already lay within the system itself. The controls system can help somewhat, but the main benefit employed here is around scheduling. About 13 hours per week of run-time can be reasonably reduced, to a total of 65 hours per week based on information provided by building operators. Further run-time reductions may be possible, but in general 65 hours per week is a reasonable approximation of average run-time for offices of this building type.

Retro-commissioning is applied to the ZNC Target Package; since most of the mechanical equipment (except the central heating plant) will remain, retro-commissioning is viable for this building.

Other measures affecting building energy demand were reviewed such as LED lighting conversions and high-efficiency water aerators. These measures do not have a large overall impact on savings and are generally non-interactive in nature, meaning savings from these measures do not appreciably increase or decrease savings from other measures.

Plug Load Management is applied to both packages, and roof-mounted solar PV is applied to the ZNC Target Package. In practice, solar PV needs to be coordinated with other measures that require roof space.

The Less-than-Five-Year Payback Package is largely constructed using similar measures as the ZNC Target Package.

Package Comparisons

Although this building can reach its ZNC target with technology available today, doing so incurs a significant cost without factoring in incentives and grants. There are some ways to reduce compliance retrofit costs and spread the upfront capital costs over time with financing, which improves the cash flow of a building as well:

- Other detailed savings measures (i.e., applicability of sensors and more advanced control techniques) may result in larger savings amounts than estimated in Table 2-6. These types of improvements may be possible with a more detailed look at the building.
- Some of the total capital cost may be effectively defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be effectively set aside to help cover part of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. Funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning and lighting measures may be possible, depending on the deficiencies found during the retro-commissioning process.

Advances in technology between now and the ZNC target date may result in viable alternative approaches, meaning reduction in the ZNC costs and payback ranges described.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- HVAC: a full replacement to the heating and cooling system with a refrigerant-based distribution system may yield higher savings but costs substantially more and is far more intrusive to tenant spaces throughout the building. In addition, more aggressive schedule adjustments (i.e., operating HVAC only 10 hours a day instead of 12) are not included.
- Dedicated Outdoor Air Systems: A DOAS may be required by code if a substantial renovation of the building occurs prior to 2035; however, the ZNC Target pathway that included DOAS as an option is a less attractive financial package than the ZNC Target Package in Table 2-6. Installation of a DOAS will result in energy reductions, presenting a possible alternative pathway to reaching the ZNC Target that is not included in this report.
- Envelope: envelope measures were reviewed but not included in either package. Other measures such as electrification generate more energy savings at similar capital outlays and are a more effective way to reach the ZNC target.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package (Not Applicable for this Case Study)

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 46 below.

Table 46: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[55].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five-year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

[55] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 3: Older All-Electric Office

Building Information

This office building was constructed in the 1970s. Most of this office space is dedicated to various office-related functions such as meeting rooms, offices, and other similar uses. This building also has a dining facility. This building also has a large base load.

Table 47. Building Characteristics – Case Study 3

Category	Building Information
Typology	Office
Square Footage	225,000 – 250,000 ft.^{2} Office: 100%
Year Built	1970 – 1975
2019 ENERGY STAR Score	30 – 35
2019 Site EUI (kBTU/SF) (calculated for this study)	80 – 90

Building System Information

The basic building system information specific to the case study building is described below.

Table 48. Building System Information – Case Study 3

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	Building automation system for central equipment only (central plant, AHUs, duct heaters), but no control over chillers.	Electric	Unknown (estimated 10 years for central, 35 years terminal)	5-10 (central), <5 (terminal)
Heating	Central electric duct heaters, perimeter VAV reheat	Electric	~40	<5
Cooling	Two centrifugal chillers; condenser water via 2-cell axial-fan cooling tower; some self-contained units (SCUs) on first floor on separate condenser loop	Electric	25	5-10
Ventilation	2x large VAV AHUs; no energy recovery	Electric	~40	<5
DHW	Unitized DHW	Electric	10-30	<5-10 (depending on heater)
Lighting	Mostly T8; one floor retrofit to LED	Electric	Unknown (estimated 10 years)	<5
Envelope	Original to the building, except roof; windows double-pane but sealing issues abound	Electric	35 (most components)	5-10
Metering	Four electric meters	Electric	N/A	N/A

The building's energy usage type and estimated end use is displayed below.

- Gas is not used at this building.
- Electricity is used for all functions of this building.

Table 49. 2019 Site EUI by End Use – Case Study 3. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
0%	0%	0%	0%	12%	9%	1%	68%	10%	**100%**

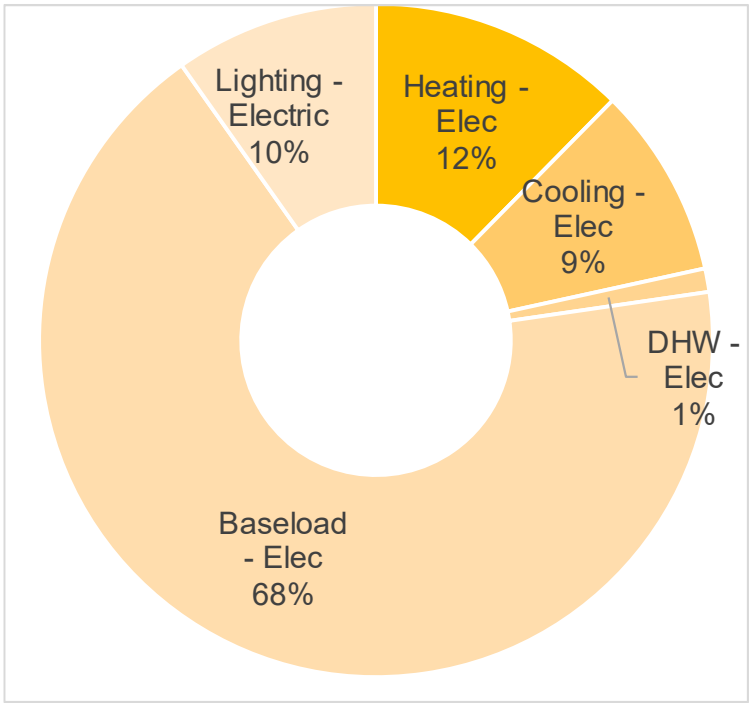

Figure 40. Site EUI Share (%) by End Use – Case Study 3

Target Determination

Site EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. The table also has an alternate target ("EE Standard"), which is no different than the ZNC Target for this building. The building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Note that the floor areas shown in the table below are approximated based on Table 48.

Table 50. Space Use Target Methodology Summary – Case Study 3

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (EE * Area%)
Office	Office	100%	250,000	53.4	53.4	53.4	53.4
Total	**-**	**100%**	**250,000**	**-**	**-**	**53.4**	**53.4**

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 51. ZNC and Interim Targets – Case Study 3

EUI Description	ZNC Target	EE Target
Baseline EUI	80 – 90	80 – 90
2026 – Interim Target 1	71 – 80	71 – 80
2030 – Interim Target 2	62 – 70	62 – 70
2035 – Target	53.4	53.4

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

An EE Target Package was not developed for this building as the ZNC Target is identical to the EE Target.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 52. EEM Package Summary – Case Study 3

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	47 – 53	41%	$323,900	$6,215,000	19.2	5%
Less-than-Five-Year Payback Package	57 – 64	29%	$226,600	$811,000	3.6	28%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 53 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 53. ZNC Target Package EEMs – Case Study 3. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Convert to VRF	Convert the mechanical system to a VRF system	25.4%	$200,600	$5,169,000	25.8	4%	18	5-10
2	Install ERV	Install an exhaust recovery ventilation unit	7.0%	$55,100	$470,000	8.5	12%	15	DNE
3	HVAC Schedule Adjustments	Adjust existing HVAC schedules to align with occupancy	3.5%	$27,900	$3,000	0.1	1,116%	5	N/A
4	Finish LED Conversion	Convert the remaining lighting systems to LED	1.4%	$10,800	$207,000	19.1	5%	10	<5
5	Plug Load Management	Install smart plug load management tools	1.4%	$11,300	$23,000	2.1	48%	10	DNE
6	Solar PV	Install roof-mounted solar PV	2.3%	$18,200	$343,000	18.8	5%	15	DNE
Total			**41.0%**	**$323,900**	**$6,215,000**	**19.2**	**5%**	**-**	

Table 54. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 3

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	0%	0%	0%	0%	12%	9%	1%	68%	10%	**100%**
End Use Difference	0%	0%	0%	0%	-80%	-47%	0%	-37%	-14%	**59%**

EE Target Package

This typology has the same ZNC target as EE target; therefore, there is no separate EE target package for this building. The ZNC target package in Table 53 would also serve as an EE target package.

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package allows the building to reach its second interim target threshold.

Table 55. Less-than-Five-Year Payback Package EEMs – Case Study 3. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Install ERV	Install an exhaust recovery ventilation unit	9.6%	$75,900	$470,000	6.2	16%	15
2	HVAC Schedule Adjustments	Adjust existing HVAC schedules to align with occupancy	13.9%	$110,000	$3,000	0.0	4,400%	5
3	Retro-commissioning	Retro-commission and implement improvements on central building systems	1.6%	$12,700	$82,000	6.5	15%	5
4	Primary Chilled Water Pump VFDs	Install primary chilled water pump variable frequency drives	0.1%	$1,000	$7,000	7.3	14%	15
5	Condenser Water Pump VFDs	Install condenser water pump variable frequency drives	0.4%	$3,400	$19,000	5.5	18%	15
6	Finish LED Conversion	Convert the remaining lighting systems to LED	1.4%	$10,800	$207,000	19.1	5%	10
7	Plug Load Management	Install smart plug load management tools	1.6%	$12,800	$23,000	1.8	55%	10
	Total		**28.7%**	**$226,600**	**$811,000**	**3.6**	**28%**	**-**

Table 56. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 3

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	0%	0%	0%	0%	12%	9%	1%	68%	10%	**100%**
End Use Difference	0%	0%	0%	0%	-52%	-42%	0%	-25%	-14%	**71%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

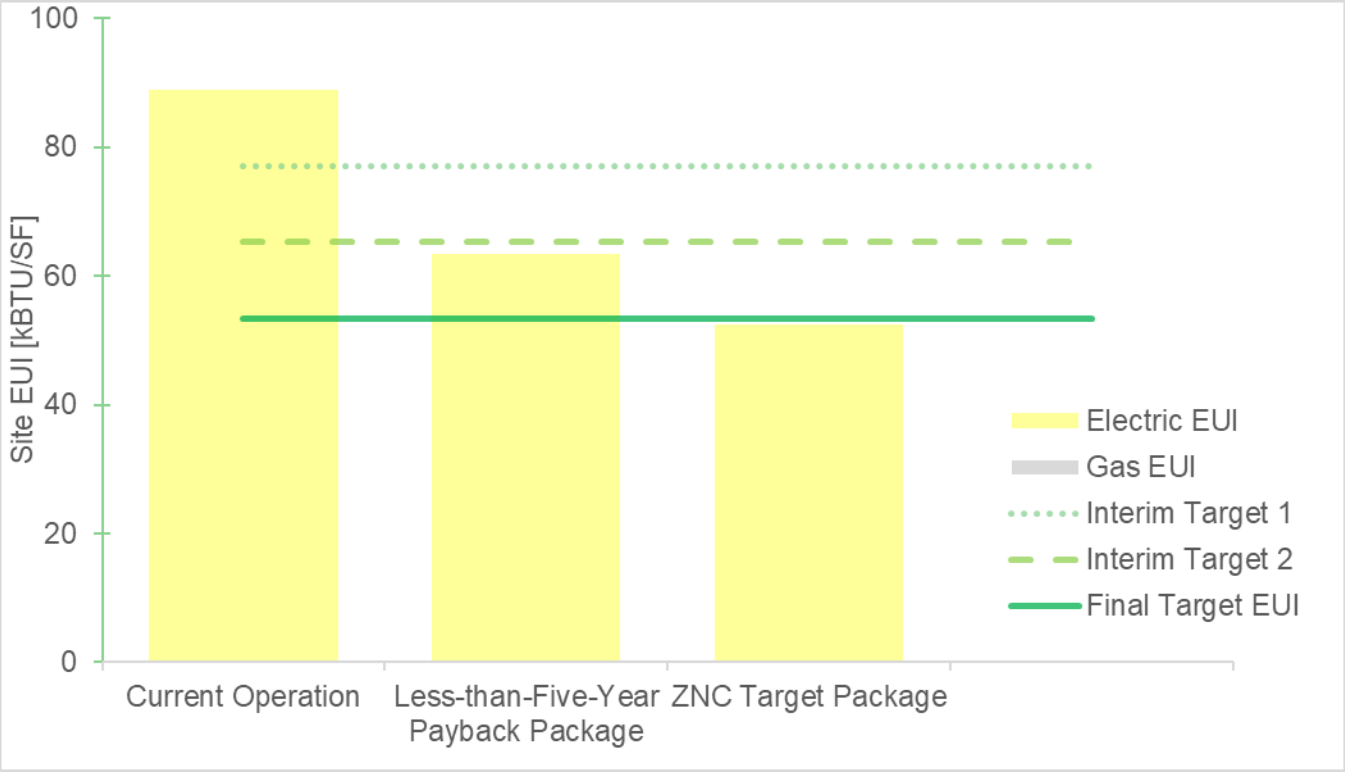

Figure 41. Target-to-Package Comparisons – Case Study 3

This building is unique among case study buildings: the Less-than-Five-Year Payback Package gets this building below the second interim target. The primary reason for this is the large reduction in energy usage from improvements in scheduling of HVAC equipment operation.

Building-Specific Technology Assessment

This office is all-electric. However, the electric heating system is relatively inefficient, and improvements are possible. This improvement can be achieved with a change to a VRF system.

VRF was determined to be a more effective measure than conversion to a heat pump loop for a handful of reasons:

- Water piping is only present in the central plant and mechanical rooms; terminal unit replacement for a WSHP loop would entail running water piping throughout the building. Refrigerant piping necessary for a VRF system is comparatively smaller.
- Removal of the existing pump loops also allows for claiming of pump and cooling tower energy savings, which is instrumental in reaching the ZNC target.

Installation of a exhaust recovery ventilation system (ERV) makes sense, as existing fresh air ductwork can be co-opted relatively easily. The combination of VRF and ERV measures consist of the major mechanical adjustments.

It should be noted that the schedule adjustments here are relatively unique. Based upon information from the building owner's staff, in 2019 this building's mechanical system was operating continually (i.e., during the technical analysis period, the building was operating continually). Since this time period, the building schedules

were adjusted to run from 5:30 AM to 11 PM on each weekday, representing a 54% reduction in run-time. This type of run-time reduction is relatively uncommon across commercial typologies but was reasonable based upon information obtained at this site.

Since 2019 data was used as the baseline period, scheduling improvements were able to be claimed for both the Less-than-Five-Year and ZNC Target Packages. In the ZNC Target Package case, the schedule adjustments should be performed at the same time as the mechanical system conversions and not handled separately.

LED conversion is not needed to meet the ZNC target but can be included in the Less-than-Five-Year Target Package thanks to the large energy cost savings found from scheduling improvements. This measure is included in the ZNC Target Package since it is likely this work would occur prior to any system conversions. In addition, utility incentives are available that would help the financial performance of this measure.

Plug Load Management is applied to both packages, and solar PV is applied to the ZNC Target Package. In practice, solar PV needs to be coordinated with other measures that require roof space (e.g., VRF system installations, DOAS installation).

A handful of items appear in the Less-than-Five-Year Payback Package that are not included in the ZNC Target Package. Since the ZNC Target Package changes the type of mechanical system, the following measures are not physically possible to implement in ZNC Target Package:

- *Retro-commissioning:* similar to other building typologies with mechanical system changes, retro-commissioning for new building systems does not make practical sense. A slightly lower end use estimate for retro-commissioning is taken for conservative reasons; in practice, the schedule adjustments seen at this building are likely *not* typical for this typology. However, combined savings of scheduling plus retro-commissioning may be reasonable. SWA assumed that some of the savings that would typically be seen via retro-commissioning are instead realized via schedule adjustments.
- *Primary Chilled Water Pump VFDs and Condenser Water Pump VFDs:* these systems appear in the baseline building but not in the new mechanical systems, as the VRF system does not have these loops.

Package Comparisons

Although this building can reach its ZNC target with technology available today, doing so incurs a significant cost and substantial disruption. There are some ways to reduce compliance retrofit costs:

- Other detailed savings measures for the existing building mechanical systems *may* be enough to reach ZNC. These types of improvements may be possible with a more detailed look at the building, which is outside the scope of this technical analysis. With enough additional realized savings, this may render other upgrades such as air sealing or installing a DOAS unnecessary to reach ZNC.
- A substantial renovation occurring between now and 2035 may trigger some method of outdoor heat recovery due to code requirements (i.e, the DOAS installation). Although this work would have to take place and be paid for regardless, if a DOAS is installed for code compliance reasons, this would not be a cost associated with compliance with the ZNC target.
- Some of the total capital cost may be effectively defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment would likely be replaced before the 2035 target. This money can be effectively set aside to help cover part of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. Funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible.

If the ZNC Target is unattainable or economically infeasible for this building, the owner may want to consider filing a Building Performance Improvement Plan.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- Building Controls: existing pneumatic controls located in individual spaces are a likely source of significant energy waste; however, developing costs for this measure is highly site-specific and beyond the scope of this case study. Based on generally accepted practices, this measure would likely have not applied for the Less-than-Five-Year Payback Package due to costs and would not be applicable to the ZNC Target Package as the pneumatic VAV controls would have been converted to a new mechanical system.
- DHW: domestic hot water is a minimal load in office buildings and was not examined.
- Envelope: envelope measures were not necessary to meet the ZNC Target.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package (Not Applicable for this Case Study)

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 57 below.

Table 57: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[56].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

[56] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 4: New High-Rise Mixed-Use Multifamily

Building Information

This is a newer multifamily complex of two buildings; since this complex has no shared building systems or physical connections between buildings, only one building in this complex was chosen for the case study. This building has first floor retail, which is a mix of restaurants and other general-purpose retail. The site contains both above ground and below grade parking. The building has in-unit electric heating and cooling systems and in-unit electric water heating that residents pay for, as well as shared common and amenity areas.

Table 58. Building Characteristics – Case Study 4

Category	Building Information
Typology	Multifamily
Square Footage	125,000 ft.^{2} – 150,000 ft.^{2} Multifamily: 92% Retail: 3% Restaurant: 2% Fitness Centers: 3%
Year Built	2000 – 2005
2019 ENERGY STAR Score	20 – 25
2019 Site EUI (kBTU/SF) (calculated for this study)	50 – 60

Building System Information

The basic building system information specific to the case study building is described below.

Table 59. Building System Information – Case Study 4

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	None	N/A	N/A	N/A
Heating	Each apartment has ducted heat pumps with electric resistance backup	Electric	Unknown (estimated 20 years)	<5
Cooling	Each apartment has ducted A/C with individual in-unit condenser equipment going through the wall	Electric	Unknown (estimated 20 years)	<5
Ventilation	DOAS units for hallways, fresh air delivered to apartments via undercuts on the door to each apartment	Electric/Gas	Unknown (estimated 20 years)	<5
DHW	Electric resistance water heaters in each apartment	Electric	Unknown (estimated 20 years)	<5
Lighting	Mostly converted to LED except for corridors and apartment fixtures	Electric	0-5	5-10
Envelope	Windows – double insulated window w/ thermal break. Wood frame construction and insulation	N/A	Windows: ~10 years, Frame: ~20 years	25-30
Metering	Apartments separately metered, retail separately metered	Electric/Gas	N/A	N/A
Other	Outdoor Pool, in-unit washer/dryer, dishwasher, disposal	Electric	Unknown (estimated 10 years)	Unknown (appliances likely 0-2 years; pool 5-10 years)

The building's energy usage type and estimated end use is displayed below.

- Gas: used in the retail spaces including restaurant or retail cooking and possibly their respective domestic hot water or heating needs. Gas is also used to heat outdoor air for the corridors. Gas makes up 13% of the building's site energy use.
- Electricity: used for nearly all needs in the multifamily portion of the building, including cooking, heating, and domestic hot water for apartments. Electricity makes up 87% of the building's site energy use.

Table 60. 2019 Site EUI by End Use – Case Study 4. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Elec	Cooling – Elec	DHW – Elec	Baseload – Elec	Lighting – Electric	Total EUI
9%	0%	0%	4%	16%	10%	21%	34%	6%	**100%**

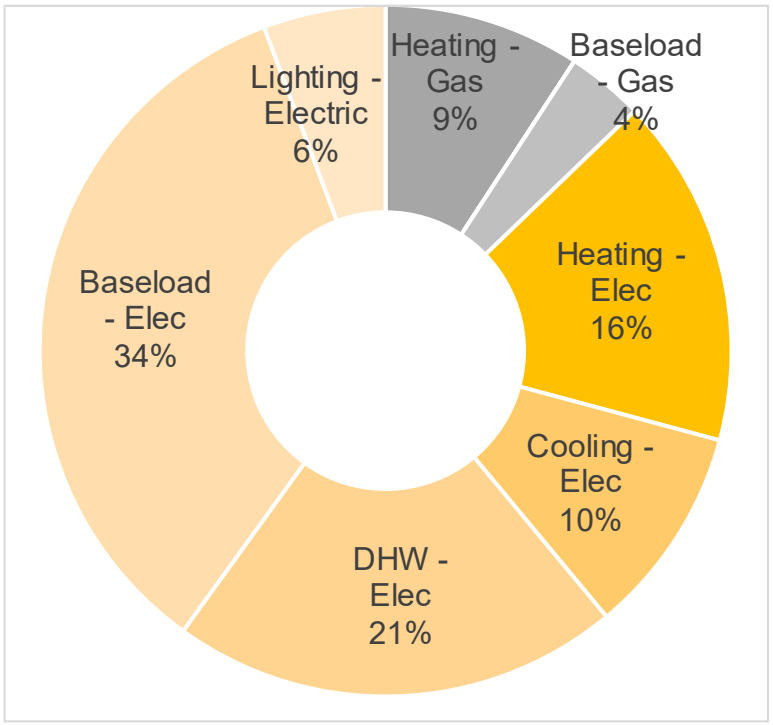

Figure 42. Site EUI Share (%) by End Use – Case Study 4

Target Determination

Site EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. The table also has an alternate target ("EE Standard"), which is higher than the current EUI of the building, indicating that the building would not need to take any action beyond maintaining current performance if the EE Standard was used. The building will need to take action in order to meet the ZNC Target. All the following analysis uses the ZNC target.

Note that the floor areas shown in the table below are approximated based on Table 59.

Table 61. Space Use Target Methodology Summary – Case Study 4

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (EE * Area%)
Multifamily Housing	Multifamily	92%	125,000	35.4	55.1	32.5	50.7
Retail Store	Mercantile Retail (other than mall)	3%	5,000	45.3	53.4	1.4	1.6
Restaurant	Food Service	2%	5,000	170.6	249.7	2.7	3.9
Fitness Center	Public Assembly	3%	5,000	61.3	83.0	2.1	2.8
Total	**-**	**100%**	**140,000**	**-**	**-**	**38.7**	**59.1**

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 62. ZNC and Interim Targets – Case Study 4

EUI Description	ZNC Target	EE Target
Baseline EUI	50 – 60	50 – 60
2029 – Interim Target 1	46 – 53	50 – 60
2033 – Interim Target 2	42 – 47	50 – 60
2037 – Target	38.7	59.1

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

An EE Target Package was not developed for this building as this building is below the EE Target.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of the packages.

Table 63. EEM Package Summary – Group 4 Case Study 4

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	35 – 38	28%	$45,000	$1,434,000	31.9	3%
Less-than-Five-Year Payback Package	50 – 60	1%	$1,500	$5,000	3.5	28%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 64 that shows the estimated remaining life of the equivalent replacement system. A “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 64. ZNC Target Package EEMs – Case Study 4. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	DOAS Conversion to Electric	Install a dedicated electric outdoor air system with heat recovery capabilities	7.2%	$2,600	$323,000	123.3	1%	15	<5
2	Electrify Retail and Restaurant	Convert tenant gas use to electric	1.4%	($2,600)	$15,000	N/A	N/A	10	Unknown (estimating 5-10)
3	Add Programmable Thermostats	Add programmable thermostats to apartments, provide instructions to occupants on use	0.8%	$2,000	$67,000	33.5	3%	10	Existing thermostats likely <10
4	High-Efficiency Water Aerators	Install low flow aerators in faucets and showers	0.6%	$1,500	$5,000	3.5	28%	10	DNE
5	Solar PV	Install canopied solar PV	16.2%	$41,500	$1,025,000	24.7	4%	15	DNE
Total			**26.2%**	**$45,000**	**$1,435,000**	**31.9**	**3%**	**-**	

Table 65. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 4

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	9%	0%	0%	4%	16%	10%	21%	34%	6%	**100%**
End Use Difference	-100%	0%	0%	-100%	10%	-2%	-3%	-41%	0%	**74%**

EE Target Package

This building already meets the EE target; no EE package was developed.

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package does not allow the building to meet any interim targets.

Table 66. Less-than-Five-Year Payback Package EEMs – Case Study 4. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	High-Efficiency Water Aerators	Install low flow aerators in faucets and showers	0.6%	$1,500	$5,000	3.5	28%	10
	Total		**0.6%**	**$1,500**	**$5,000**	**3.5**	**28%**	**-**

Table 67. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 4

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	9%	0%	0%	4%	16%	10%	21%	34%	6%	**100%**
End Use Difference	0%	0%	0%	0%	0%	0%	-3%	0%	0%	**99%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

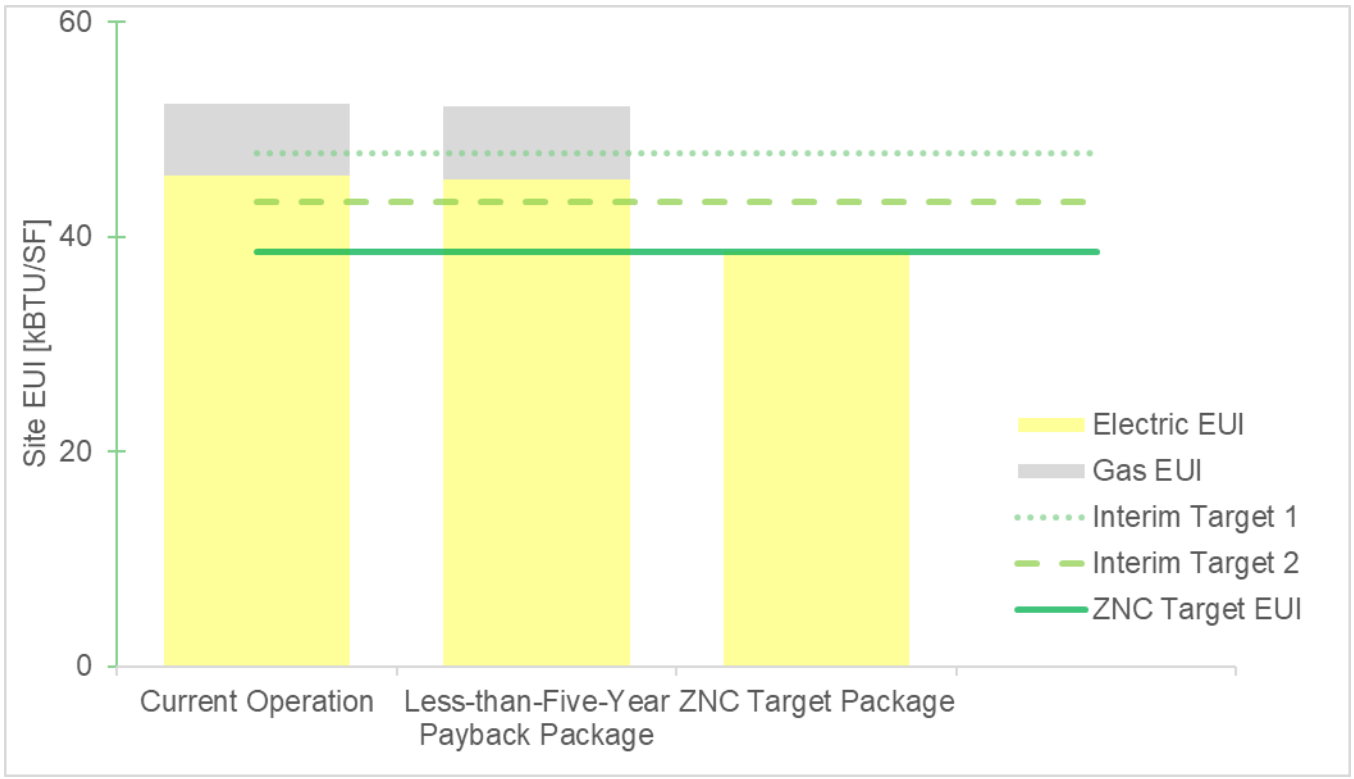

Figure 43. Target-to-Package Comparisons – Case Study 4

As seen in Figure 43, viable measures apply to the ZNC Target Package. However, the ZNC target is well within range for this typology.

Building-Specific Technology Assessment

This multifamily building is a newer building; the only current gas usage in the apartment building is to heat outdoor air for the hallways. Electrification at this building entails converting that outdoor air unit and any restaurant or retail gas usage.

The heating, cooling, and hot water systems in the building use a large portion of the building's energy and upgrades to that equipment may result in energy savings. However, upgrades to this distributed equipment in each apartment would be highly intrusive to residents. Additionally, the equipment is already all electric and while the space and water heating equipment could be upgraded to heat pumps to improve efficiency, the savings may not justify the disruption to tenants. Therefore, improvements to the space heating/cooling and water heating are not included in this package.

Programmable thermostats could improve existing technology while providing an amenity to residents. Programmable thermostat savings are highly dependent upon each resident's actions to ensure that schedules are created and maintained. Actual realized savings for this measure may be notably more or less than the estimated amount.

Following these considerations, other measures affecting building energy demand were then chosen (items like LED lighting conversions and high-efficiency aerators). These measures did not have a large overall impact on savings and were generally non-interactive in nature, meaning any resultant savings from these measures do not appreciably increase or decrease savings from other measures.

Lastly, solar PV was applied. This building has a relatively complex roof structure with both flat and pitched sections, and mechanical equipment distributed on the roof. For this building, a canopy solar PV system was evaluated. A canopy solar PV system is structured to sit above the roof over other equipment. The parking garage for this building is underground, so there is no opportunity to incorporate solar PV on the garage.

Package Comparisons

Reaching the ZNC target for this building is a relatively simple exercise through building upgrades but is not particularly cost effective from a total cost perspective. Most other building typologies take advantage of the savings offered by the Less-than-Five-Year Payback Package to build cost savings to pay for the ZNC Target Package. In this building, there are not measures with high energy cost savings potential to improve the overall package economics.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital cost may be effectively defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment would likely be replaced before the 2035 target. This money can be effectively set aside to help cover parts of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. These funds are available on three-year cycles, and the program offerings can change during the program cycle, so incentive estimates are not included in this report.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- HVAC: upgrades to resident heating and cooling equipment to use variable refrigerant flow (VRF) systems would decrease energy use, but because the in-unit heating is already a heat pump with supplemental electric resistance, the savings would be relatively small. This measure would also be highly intrusive to tenants unless completed at apartment turnover across a longer time horizon. Still, long term improvements to in-unit HVAC equipment would gradually decrease whole building electricity

use, which can contribute to meeting the performance standard. Given the age of the HVAC systems it is likely some upgrade to the HVAC system is needed prior to 2035; at this time, a VRF system should be considered. However, it was not necessary in this package to meet the ZNC.

- Retro-commissioning: the main benefits from retro-commissioning would be from reviewing and adjusting in-unit HVAC, as that makes up the majority of the heating and cooling energy use. Typically, retro-commissioning is done on large pieces of base building equipment. Most base building equipment replacement is part of the ZNC package, and new equipment would be commissioned as part of the installation process. The maintenance of in-unit equipment is performed by building staff when apartment access is feasible, such as at apartment turnover. A short-term effort to retro-commissioning in-unit equipment would be a highly intrusive process as it would require building staff to enter each apartment and investigate each piece of equipment. Persistence of savings would also be difficult to maintain, as it would require each occupant to commit to not making individual adjustments through the lifetime of the equipment.
- Lighting: completing an LED conversion was reviewed. Conversion options for existing 4-pin fixtures do exist but were determined to be a less cost-effective measure than other measures included within the ZNC Target Package. Utility incentives may help defray some of these costs.
- Appliances: Conversion of in-unit appliances to high-efficiency was reviewed. Similar to lighting, this conversion can occur but would not be as cost-effective as other measures included within the ZNC Target Package.
- Domestic hot water: The in-unit water heaters are electric resistance and upgrading to heat pump water heaters would be a difficult and costly measure. The energy savings from heat pump water heaters was not needed to reach the ZNC target and would be highly intrusive.
- Envelope: Envelope measures are not needed for this building to reach the ZNC target. Being a recently constructed building, the wall and window insulation levels are adequate, making upgrades less cost effective resulting in less energy savings.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.

- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package (Not Applicable for this Case Study)

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 68 below.

Table 68: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[57].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages

[57] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 5: Old High-Rise Affordable Multifamily

Building Information

This is an older high-rise multifamily building. It underwent a substantial internal and external renovation within the last decade, including new double-paned windows, central cooling, and solar hot water collector system. Heating and cooling are provided to apartments via a fan-coil distribution system.

Table 69. Building Characteristics – Case Study 5

Category	Building Information
Typology	Multifamily
Square Footage	125,000 ft.^{2} – 150,000 ft.^{2} Multifamily Housing: 100%
Year Built	1965 – 1970
2019 ENERGY STAR Score	N/A*
2019 Site EUI (kBTU/SF)	70 – 80

**This building was not benchmarked, as multifamily buildings are not required to benchmark under the County's Benchmarking Law at the time of this case study's completion.*

Building System Information

The basic building system information specific to the case study building is described below.

Table 70. Building System Information – Case Study 5

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	None	N/A	N/A	N/A
Heating	2x gas-fired boilers, which also serve supplemental DHW, hydronic heating distribution	Gas	8	15-20
Cooling	1x 150-ton screw chiller; fan coils in apartments. Both heating and cooling supplied via two-pipe system (i.e., system can only operate in heating or cooling)	Electric	8	15-20
Ventilation	2x rooftop units with gas heat and electric compressors	Electric (cooling); gas (heating)	8	10-15
DHW	Solar DHW with heating boilers as backup	Solar / gas	8	10 (solar) 15-20 (boilers)
Lighting	Most lighting converted to LED	Electric	3	5-8
Envelope	Windows upgraded recently; rest of envelope original	N/A	8 (windows); ~50 years (others)	~30 years (windows); 5-15 years (other envelope components)
Metering	Centrally metered electric and gas	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end use are displayed below.

- Gas: used for heating and domestic hot water plus in-unit cooking. Sixty-eight percent of the building's energy use is in the form of gas. The solar hot water collectors serve to partially offset some of the domestic hot water load.
- Electricity: used for cooling, ventilation, lighting, and electric plug loads. Thirty-two percent of the building's energy use is in the form of electricity.

Table 71. 2019 Site EUI by End Use – Case Study 5. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**

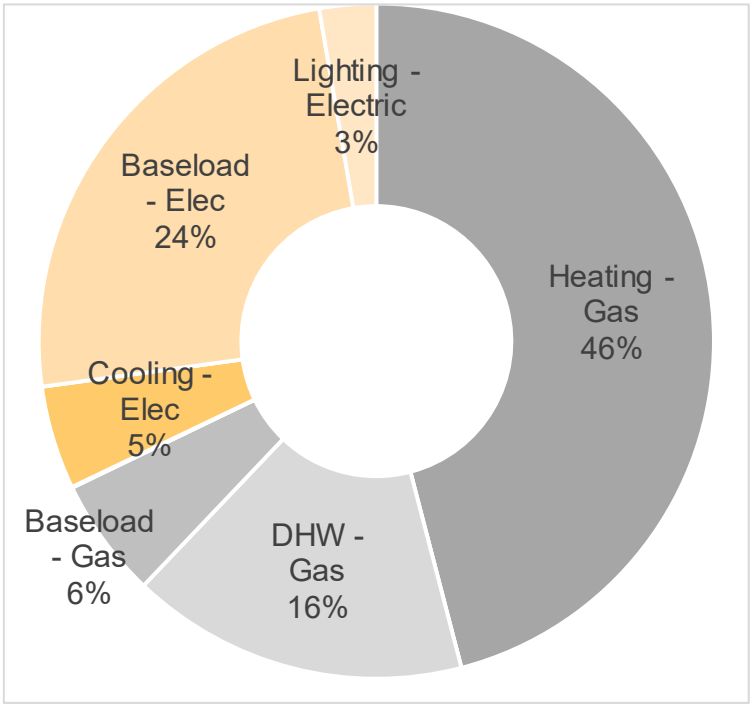

Figure 44. Site EUI Share (%) by End Use – Case Study 5

Target Determination

EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. The table also has an alternate target ("EE Standard"); the building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 72. Space Use Target Methodology Summary – Case Study 5

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (EE * Area%)
Multifamily Housing	Multifamily	100%	125,000	35.4	55.1	35.4	55.1
Total	**-**	**100%**	**125,000**	**-**		**35.4**	**55.1**

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 73: ZNC and Interim Targets – Case Study 5

EUI Description	ZNC Target	EE Target
Baseline EUI	70 – 80	70 – 80
2029 – Interim Target 1	58 – 65	65 – 72
2033 – Interim Target 2	45 – 50	60 – 65
2037 –Target	35.4	55.1

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *EE Target Package* is based upon energy efficiency measures to reach the EE Target for this building. Note that the ZNC Target Package can also be used to reach the EE Target, but the EE Target Package reduces EUI only as far as needed to meet the EE Target.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 74. EEM Package Summary – Case Study 5

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	32 – 35	53%	$38,900	$2,221,000	57.1	2%
EE Target Package	50 – 57	28%	$46,000	$1,293,000	28.3	4%
Less-than-Five-Year Payback Package	64 – 73	9%	$31,700	$89,000	2.8	32%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 75 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 75. ZNC Target Package EEMs – Case Study 5. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert the central mechanical system to an air-to-water heat pump system	35.4%	$15,300	$1,294,000	84.7	1%	15	15-20
2	Electrify DHW	Convert domestic hot water gas heating to electric air-to-water heat pump systems	10.1%	($2,800)	$625,000	N/A	N/A	15	15-20
3	Central Plant Pump VFDs	Install variable frequency drives on central distribution pumps	2.9%	$10,300	$8,000	0.8	131%	15	DNE
4	Booster Pump VFDs	Install variable frequency drives on domestic water booster pumps	0.4%	$1,400	$5,000	3.7	27%	15	DNE
5	High-Efficiency Water Aerators	Install high-efficiency aerators in faucets and showers	0.2%	$600	$5,000	8.4	12%	10	DNE
6	Solar PV	Install roof-mounted solar PV	4.0%	$14,100	$284,000	20.1	5%	15	DNE
Total			**53.0%**	**$38,900**	**$2,221,000**	**57.1**	**2%**	**-**	

Table 76: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 5

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-100%	0%	-100%	0%	100%	16%	100%	-36%	0%	**47%**

EE Target Package

As some EE Target measures entail replacement of existing equipment, an additional column is added to Table 77 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 77. EE Target Package EEMs – Case Study 5. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify DHW	Convert domestic hot water gas heating to electric air-to-water heat pump systems	10.1%	($2,800)	$625,000	N/A	N/A	15	15-20
2	Install ERV	Install an exhaust recovery ventilation unit	7.9%	$17,000	$317,000	18.7	5%	15	DNE
3	Retro-Commissioning	Retro-commission and implement improvements on central building systems	3.8%	$8,500	$44,000	5.2	19%	5	DNE
4	Central Plant Pump VFDs	Install variable frequency drives on central distribution pumps	2.5%	$8,800	$8,000	0.9	112%	10	DNE
5	CW Pump VFDs	Install variable frequency drives on condenser water pumps	0.3%	$1,100	$6,000	5.2	19%	15	DNE
6	Booster Pump VFDs	Install variable frequency drives on domestic water booster pumps	0.3%	$1,200	$5,000	4.5	22%	15	DNE
7	High-Efficiency Water Aerators	Install high-efficiency aerators in faucets and showers	0.2%	$600	$5,000	8.8	11%	10	DNE
8	Solar PV	Install roof-mounted solar PV	3.2%	$11,300	$284,000	25.1	4%	15	DNE
Total			**28.4%**	**$45,700**	**$1,294,000**	**28.3**	4%	**-**	

Table 78: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for EE Target Package – Case Study 5

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-15%	0%	-100%	0%	0%	-22%	0%	-46%	-5%	**72%**

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package does not allow the building to meet any interim targets.

Table 79. Less-than-Five-Year Payback Package EEMs – Case Study 5. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Retro-Commissioning	Retro-commission and implement improvements on central building systems	4.7%	$9,200	$44,000	4.8	21%	5
2	Central Plant Pump VFDs	Install variable frequency drives on central distribution pumps	2.8%	$9,700	$8,000	0.8	124%	10
3	CW Pump VFDs	Install variable frequency drives on condenser water pumps	0.4%	$1,300	$6,000	4.7	21%	15
4	Booster Pump VFDs	Install variable frequency drives on domestic water booster pumps	0.4%	$1,300	$5,000	4.0	25%	15
5	High-Efficiency Water Aerators	Install high-efficiency aerators in faucets and showers	0.4%	$500	$5,000	10.1	10%	10
	Total		**8.6%**	**$22,000**	**$68,000**	**3.1**	**32%**	**-**

Table 80. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 5

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-5%	0%	-8%	0%	0%	-5%	0%	-19%	-5%	**91%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

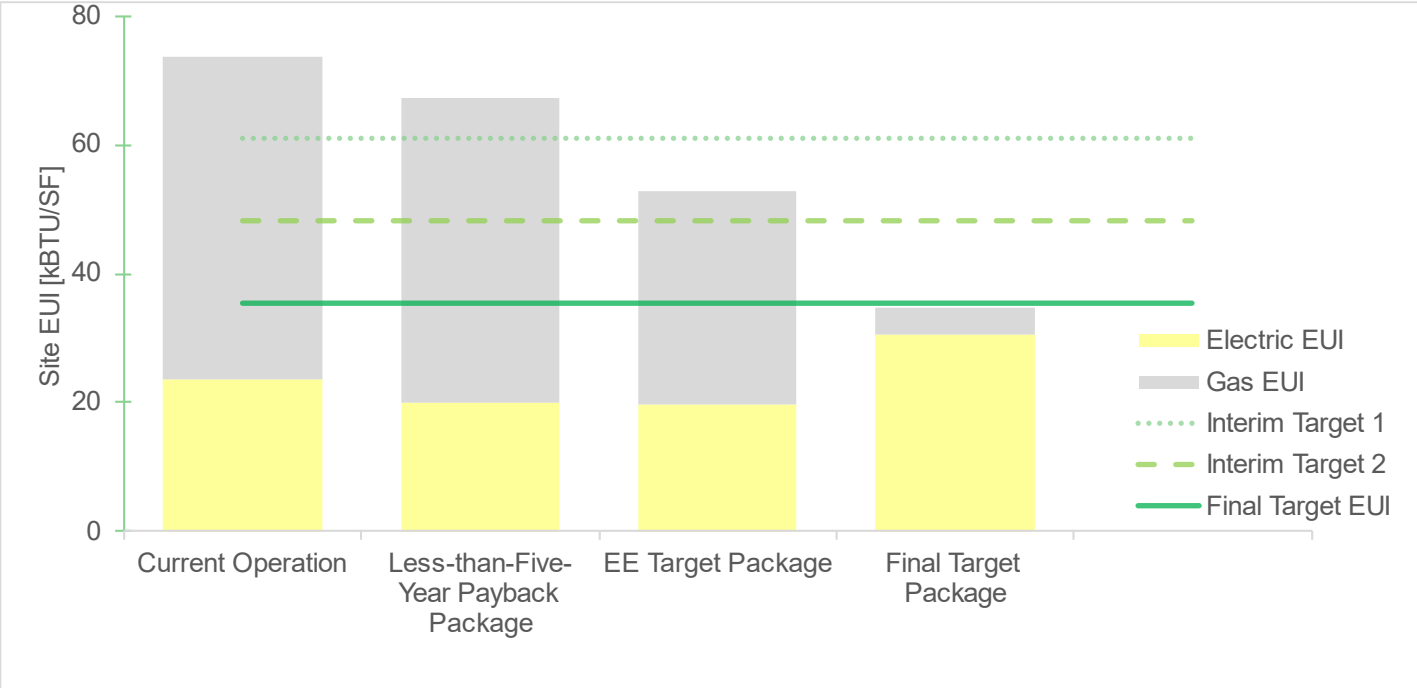

Figure 45. Target-to-Package Comparisons – Case Study 5

Although some low-cost measures make it into the Less-Than-Five-Year Payback Package, this package is insufficient to reach any of the Interim Targets, much less the ZNC Target. The EE Target Package would get the facility most of the way to the 2nd Interim Target; the EE Target Package mostly reduces gas usage compared to the Less-than-Five-Year Payback Package.

The ZNC Target can be reached with substantial onsite electrification converting existing gas loads to electric. Additional discussion is available in the Case Study Measures Identification Methodology.

Building-Specific Technology Assessment

This multifamily building has two major issues making it difficult for it to reach the ZNC Target with the current systems:

- A large amount of gas use (68%) which acts as a limit on how effective non-fuel-switching measures can be in reducing site EUI.
- The distance between current usage and the ZNC Target is substantial, representing a 53% reduction in current energy usage.

Given those items, electrification of building loads represents the only realistic path for this site to reach the ZNC Target. For this building, converting the existing fan coil system to a water-source heat pump system gains the benefit of reusing existing piping risers compared to other electrification conversion technology (i.e., VRF) which entails entirely new piping runs throughout the building.

For this building, reaching the EE target is a comparatively simpler lift, representing only a 28% reduction in energy use. However, this still requires some electrification in order to be reached.

Some electrification considerations for this facility are as follows:

- Aiming for efficiency gains in existing gas-fired equipment is not realistic based on technology available today. While some optimization methods can help (and do appear in the Less-than-Five-Year Payback Package), they do not cover this energy gap.
- Electrifying heating but not DHW does not reach the ZNC Target Package; however, it *does* serve to reach the EE Target on its own. However, this would be a less cost-effective method than the method used in this case study.
- Electrifying DHW but not heating also does not reach the ZNC Target Package, but it does allow for the EE Target Package to take advantage of incremental improvements to the HVAC system of the building, which in turn create a more cost-effective package. This approach was used to develop the EE Target Package.
- Electrifying cooking loads in lieu of electrifying either HVAC or DHW does not do enough on its own to reach ZNC or EE. Electrifying cooking loads *can* be an alternative path compared to the EEMs shown in Table 75 to meet the ZNC target once HVAC and DHW loads are electrified (and this would also remove the remaining on-site fuel used), but other, more cost-effective methods are used in this case study.

The EE Target Package also includes installation of an ERV. This measure is not included in either the ZNC Target Package or the Less-than-Five-Year Payback Package for the following reasons:

- The ZNC Target can be met with space heating, DHW electrification, and other smaller measures indicated in Table 75. These measures offer a better ROI in total than ERV installation.
- ERV installation is not cost-effective enough to include in the Less-than-Five-Year Payback Package.

A handful of measures in the Less-than-Five-Year Payback Package are also included in the EE Target and/or ZNC Target Packages. These are relatively low-cost measures that help bring down the overall payback of this option and include some central plant retrofits such as central plant VFDs and other ancillary upgrades such as low flow aerators; these measures do not have a large overall impact on savings and are generally non-interactive in nature.

Once these measures were identified, solar PV savings are applied to the building. This building has existing solar hot water collectors. In order to make “room” for the solar PV system, these hot water collectors need to be removed. This increases the domestic hot water load met by the hot water system and negatively impacts the finances of the solar PV system. To make the most use of the solar DHW, the solar PV can be installed at the end of the functional life of the solar DHW system, which is likely before the final target date of the performance standard.

Once electrification of HVAC and DHW loads were implemented, the ZNC target for this building can be satisfied by either installing solar PV or by electrifying cooking; since electrifying cooking results in an energy cost increase for the building, solar PV is used instead.

The Less-than-Five-Year Payback Package are largely constructed using similar measures as the ZNC Target Package with two notable exceptions:

- Retro-commissioning is applied to the central plant equipment to remain only. In-unit retro-commissioning would be a highly intrusive process and not realistic for the Less-Than-Five-Year Package. The HVAC system will largely be replaced in the ZNC Target Package and so retro-commissioning is not an eligible measure in the ZNC target.
- Condenser Water Pump VFDs does not apply. With conversion to a heat pump loop, the central plant pumps serve both the heating and condenser water loop, making this measure unnecessary.

Package Comparisons

Reaching ZNC targets incurs a large overall cost to the property; most of these costs are borne from either electrification measures such as heat pump conversion or electrifying domestic hot water. However, the ZNC target for this building is reachable with technologies available today.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital costs may be effectively defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be set aside to help cover parts of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. These funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The EE Target Package incurs less overall cost than the ZNC Target Package and higher cost savings.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible.

Measures Not Recommended

Measures reviewed for the building but not included in either EEM package are described below.

- Envelope: envelope improvements are not needed to meet the ZNC target and are not cost-effective enough to include in the Less-than-Five-Year Payback Package.
- Cooking: electrifying cooking is not needed to meet ZNC or EE as described above. Furthermore, this measure increases energy cost given the utility rates used for this analysis.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the However, they may appear in the EE Target Package or Less-than-Five-Year Payback Package.

- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 81 below.

Table 81: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[58].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

[58] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 6: Garden-Style Multifamily

Building Information

This case study is an affordable housing garden-style apartment complex. The complex has multiple 3-to-4 story buildings with approximately 75 apartment units. The complex has a central heating hot water and domestic hot water plant with window air conditioners for cooling. The building is master metered for electricity and natural gas. There is a common area laundry facility on site, and above ground open parking.

Table 82. Building Characteristics – Case Study 6

Category	Building Information
Typology	Multifamily
Square Footage	50,000 ft.^{2} – 75,000 ft.^{2} Multifamily Housing: 100%
Year Built	1950 – 1955
2019 ENERGY STAR Score	N/A*
2019 Site EUI (kBTU/SF)	115 – 125

**This building was not benchmarked, as it was not required to benchmark under the County's Benchmarking Law at the time of this case study's completion.*

Building System Information

The basic building system information specific to the case study building is described below.

Table 83. Building System Information – Case Study 6

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	None	N/A	N/A	N/A
Heating	Two hot water boilers, hydronic heating distribution across all buildings	Gas	Unknown (estimated >10 years)	Unknown (estimated 5-10 years)
Cooling	Window AC units	Electric	Unknown (estimated 1-8 years)	Unknown (estimated 0-5 years)
Ventilation	Sidewall vents in kitchens and bathrooms only	N/A	N/A	N/A
DHW	Two hot water DHW heaters	Gas	3	12-17
Lighting	Primarily fluorescent / CFL	Electric	Unknown (estimated 5 years)	Unknown (estimated 0-5 years)
Envelope	Likely original	N/A	Unknown (estimated 40 years)	Unknown (estimated 40 years)
Metering	One electric meter for the complex Three gas meters: one with the boilers, two for residential cooking	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end use is displayed below.

- Gas: used for heating hot water, domestic hot water, and residential cooking. 82% of the building's energy use is in the form of gas.
- Electricity: used for cooling, pumping, ventilation, lighting, and electric plug loads. 18% of the building's energy use is in the form of electricity.

Table 84. 2019 Site EUI by End Use – Case Study 6. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Lighting – Electric	Baseload – Electric	Total EUI
51%	0%	25%	6%	3%	4%	0%	9%	2%	**100%**

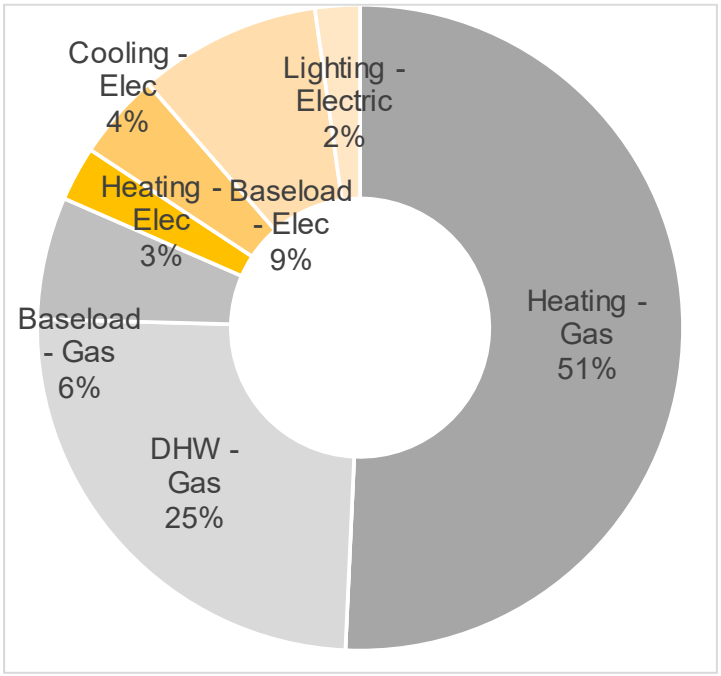

Figure 46. Site EUI Share (%) by End Use – Case Study 6

Target Determination

EUI targets are determined by a weighted average of applicable ZNC targets per space use type. The table also has an alternate target ("EE Standard"); the building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 85. Space Use Target Methodology Summary – Case Study 6

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (EE * Area%)
Multifamily Housing	Multifamily	100%	50,000	35.4	55.1	35.4	55.1
Total	**-**	**100%**	**50,000**	**-**	**-**	**35.4**	**55.1**

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 86: ZNC and Interim Targets – Case Study 6

EUI Description	ZNC Target	EE Target
Baseline EUI	115 – 125	115 – 125
2029 – Interim Target 1	90 – 95	95 – 102
2033 – Interim Target 2	60 – 65	75 – 80
2037 – Target	35.4	55.1

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *EE Target Package* is based upon energy efficiency measures to reach the EE Target for this building. Note that the ZNC Target Package can also be used to reach the EE Target, but the EE Target Package reduces EUI only as far as needed to meet the EE Target.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 87. EEM Package Summary – Case Study 6

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	31 – 34	73%	$60,400	$1,621,000	26.8	4%
EE Target Package	51 – 55	56%	$58,700	$1,261,000	21.5	5%
Less-than-Five-Year Payback Package	107 – 117	7%	$10,500	$30,300	2.9	35%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 88 that shows the estimated remaining life of the equivalent replacement system. A “N/A” indicates the existing system is not replaced, and a “DNE” means the package adds a system or piece of equipment that does not currently exist onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 88. ZNC Target Package EEMs – Case Study 6. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert the central mechanical system to a ductless split heat pump system	41.0%	$18,500	$745,000	40.2	2%	15	5-10
2	Electrify Water Heating	Convert domestic hot water gas heating to electric air-to-water heat pump systems	17.3%	$1,800	$360,000	201.7	1%	15	12-17
3	High-Efficiency Water Aerators	Install low flow aerators in faucets and showers	0.2%	$500	$3,000	5.9	17%	15	DNE
4	Solar PV	Install roof-mounted solar PV	14.3%	$39,600	$513,000	13.0	8%	15	DNE
Total			**72.8%**	**$60,400**	**$1,621,000**	**26.8**	**4%**	**-**	

Table 89. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 6

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	51%	0%	25%	6%	3%	4%	0%	9%	2%	**100%**
End Use Difference	-100%	0%	-100%	0%	171%	-41%	100%	-41%	-41%	**27%**

EE Target Package

As some EE Target measures entail replacement of existing equipment, an additional column is added to Table 90 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 90. EE Target Package EEMs – Case Study 6. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert the central mechanical system to a mini-split DX system	41.0%	$18,500	$745,000	40.2	2%	15	15-20
2	High-Efficiency Water Aerators	Install low flow aerators in faucets and showers	0.6%	$500	$3,000	5.4	18%	15	DNE
3	Solar PV	Install roof-mounted solar PV	14.3%	$39,600	$513,000	13.0	8%	15	DNE
Total			**55.9%**	**$58,600**	**$1,261,000**	**21.5**	**5%**	**-**	

Table 91: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for EE Target Package – Case Study 6

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	51%	0%	25%	6%	3%	4%	0%	9%	2%	**100%**
End Use Difference	-100%	0%	-2%	0%	124%	-51%	0%	-51%	-51%	**44%**

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package does not allow the building to meet any interim targets.

Table 92. Less-than-Five-Year Payback Package EEMs – Case Study 6. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Retro-Commissioning	Retro-commission and implement improvements on central building systems	4.3%	$4,900	$21,000	4.3	23%	5
2	Hot Water Pump VFDs	Install variable frequency drives on heating hot water pumps	1.8%	$5,100	$6,000	1.3	80%	15
3	High-Efficiency Water Aerators	Install low flow aerators in faucets and showers	0.6%	$500	$3,000	5.7	18%	15
	Total		**6.7%**	**$10,500**	**$30,000**	**2.9**	**35%**	**-**

Table 93. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 6

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	51%	0%	25%	6%	3%	4%	0%	9%	2%	**100%**
End Use Difference	-7%	0%	-5%	0%	0%	0%	0%	-25%	-5%	**93%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

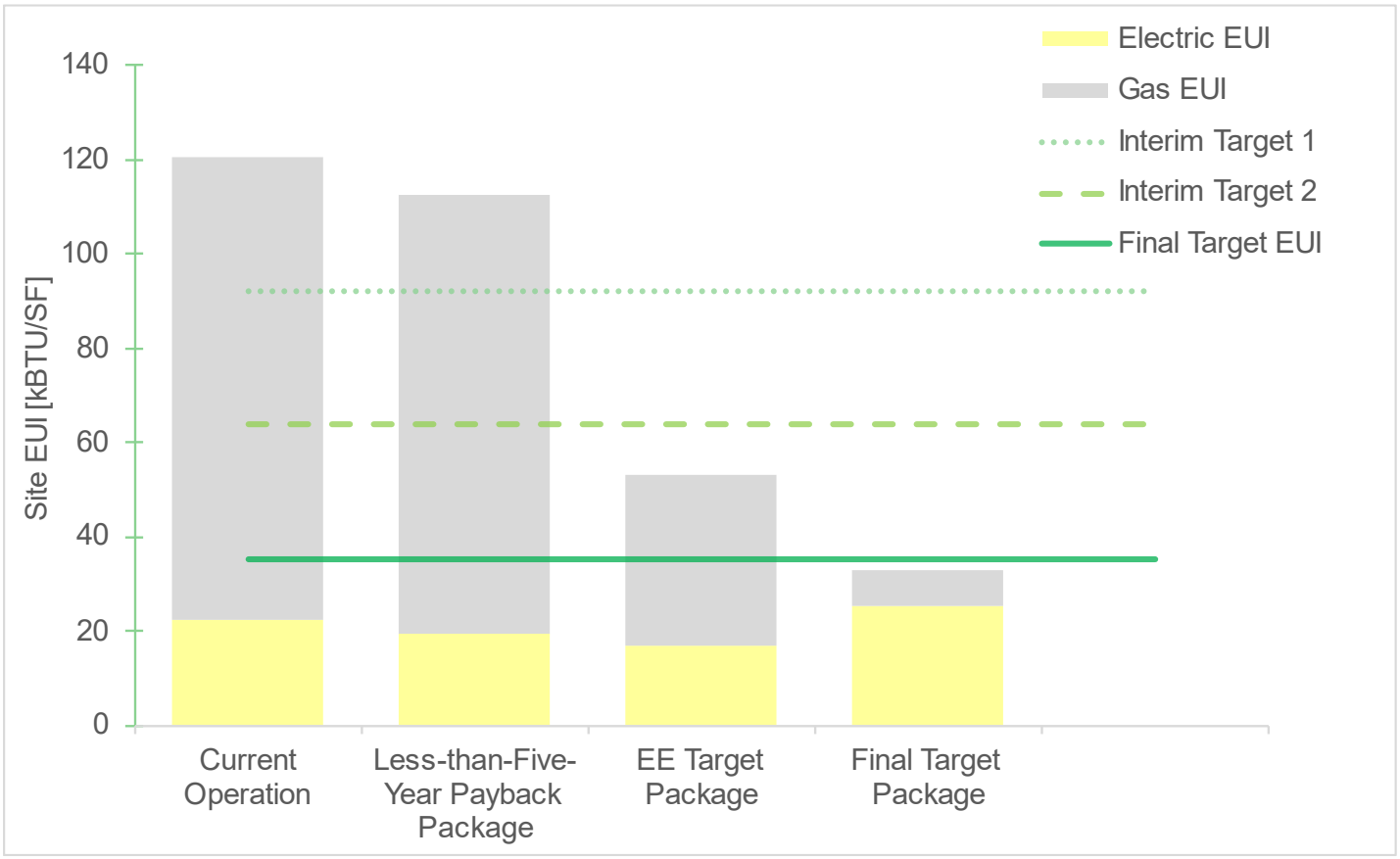

Figure 47. Target-to-Package Comparisons – Case Study 6

The chart above indicates the limitations of the Less-than-Five-Year Payback Package to realize substantial onsite savings. The EE Target Package reaches the second interim target but requires substantial electrification. The building can meet the ZNC target even without fully electrifying. This is due to garden-style building's ability to offset a larger portion of their energy usage effectively by solar.

Building-Specific Technology Assessment

This multifamily building has two issues making it difficult for it to reach the ZNC Target with current technology:

- A large amount of gas use (82%) which acts as a limit on how effective non-fuel-switching measures can be in reducing site EUI. Furthermore, this is the only building among those included in this analysis where heating represents at least 50% of total building energy.
- The distance between current usage and the ZNC Target is substantial, representing a 71% reduction in current energy usage.

Similar issues exist with the EE Target, although the end goal is a 55% reduction instead of a 71% reduction.

Some approaches were discussed:

- Aiming for efficiency gains in existing equipment did not seem realistic based on technology available today. In effect, gas-fired equipment would need to approach or exceed 100% efficiency in order to be

in range of the ZNC or EE Targets. While some optimization methods can help (and do appear in the Less-than-Five-Year Payback Package), they do not cover this energy gap.
- Partial electrification was reviewed but this was determined to not appreciably impact the ability of the building to reach ZNC. However, partial electrification was found to be useful for the EE Target Package.

For the EE Target Package, electrification of the space heating system represented the better approach. This was for two reasons:

- A large percentage of energy use (over 50%) is used for space heating. Electrifying this load represented a far better option for saving energy instead of DHW, which is only 25% of building energy use.
- There were not many options “lost” through optimizing the existing mechanical system, as the mechanical system for this building is not easily able to be optimized. As a result, there is minimal opportunity cost loss.

Electrification of the HVAC and DHW end uses represented the only realistic path for this site to reach the ZNC Target. For HVAC, converting the system to distributed ductless heat pumps was chosen as the most realistic option. For DHW, a semi-distributed option with a hot water heat pump plant per building was chosen.

Electrification on its own was not sufficient to reach the ZNC target.

Once electrification measures were identified, other measures affecting building demand were then choisen (items like high-efficiency aerators); these measures did not have a large overall impact on savings and were generally non-interactive in nature.

Applying solar PV to this property reduces grid-supplied electricity use substantially. This building type has a large roof area for its total square footage, which in turn would allow for a large amount of solar to be installed. This amount of solar was sufficient to meet the ZNC target in conjunction with other package measures.

An alternative approach would be to electrify cooking, which would reduce the need to maximize the size of a solar PV array by reduce cooking energy use. However, this is likely to be a less financially attractive approach.

There were minimal differences between the EE Target Package and the ZNC Target Package; as noted above, electrifying the HHW system represented the best option for this building to save energy, but electrifying the DHW system was less financially attractive than solar PV. Only one of these measures would be needed to reach the EE Target; based on the methodology chosen for this study, solar PV was used instead of electrifying DHW.

The Less-than-Five-Year Payback Package was largely constructed using similar measures as the ZNC Target Package with two notable exceptions:

- Retro-commissioning would be applied to the central plant equipment only. In-unit retro-commissioning would be a highly intrusive process, and there isn’t much equipment or savings potential in the apartments, so in-unit retro-commissioning is not included in the Less-Than-Five-Year Package. The HVAC system would be replaced in the ZNC Target Package and EE Target Package.
- Hot Water Pump VFDs would not apply; with conversion to a distributed heat pump system, the central plant pumps would no longer be necessary, making this measure unnecessary.

Package Comparisons

Reaching ZNC targets incur a large overall cost to the property. Most of these costs are borne from either electrification measures such as heat pump conversion or envelope measures such as air sealing and adding insulation. However, the ZNC target for this building is reachable with technologies available today.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital cost may be effectively defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment would likely be replaced before the 2035 target. This money can be effectively set aside to help cover parts of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. These funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The EE Target Package incurs less overall cost than the ZNC Target Package and higher cost savings.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- Envelope: Window replacements were considered but ultimately determined to not be needed to meet the ZNC target and were not cost-effective enough to include in the Less-than-Five-Year Payback Package.
- Cooking: electrifying cooking was not needed to meet ZNC if the solar PV system size is maximized. Furthermore, this measure increases energy cost given utility rates used for this analysis.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the EE Target Package or Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).

- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 94 below.

Table 94: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[59].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other

[59] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile,

these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 7: Mid-Sized Hotel with Conference and Other High-Use Spaces

Building Information

This is a mid-size hotel with notable common areas, such as a conference center, restaurant, and room service. The facility originally had a pool, but it has been converted to additional meeting space.

Fan coil units serve the hotel rooms. A dedicated outdoor air ventilation system provides fresh air to the hotel rooms via hotel corridors.

Table 95. Building Characteristics – Case Study 7

Category	Building Information
Typology	Lodging
Square Footage	150,000 ft.^{2} – 175,000 ft.^{2} Hotel: 100%
Year Built	1990 – 1995
2019 ENERGY STAR Score	30 – 35
2019 Site EUI (kBTU/SF) (calculated for this study)	115 – 125

Building System Information

The basic building system information specific to the case study building is described below.

Table 96. Building System Information – Case Study 7

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	Energy Controls System (main HVAC equipment); central control system installation scheduled for hotel rooms	Electric	Unknown (estimated 10 years)	Unknown (estimated 5-10 years)
Heating	Four hot water boilers, 2000 kBTU each. Four-pipe fan coil distribution	Gas	15	5-10
Cooling	Two recently overhauled 175 ton chillers with a heat exchanger for free cooling in the winter. Four-pipe fan coil distribution	Electric	30	<5
Ventilation	DOAS serving the corridors; FCUs (4-pipe) in hotel rooms. AHUs have separate outdoor air introduction than the DOAS	Electric	Unknown (estimated 25-30 years)	Unknown (estimated 0-5 years)
DHW	Two boilers, non-condensing	Gas	15	5-10
Lighting	Mostly LED – back of house and parking are not LED	Electric	28	<5
Envelope	Largely unchanged in last 5-10 years	N/A	Unknown (estimated 30 years)	Unknown (estimated 15-20 years depending on component, save roof)
Metering	Centrally metered electric and gas	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end use are displayed below.

- Gas: used primarily for heating hot water and domestic hot water usage. An onsite restaurant also uses some gas (described in this report as base load), as does onsite laundry. Gas makes up 55% of the building's energy use.
- Electricity: used for cooling, ventilation, lighting, and electric plug loads. Electricity makes up 45% of the building's energy use. Fan coil units (FCUs) in hotel rooms and air handling units (AHUs) in common spaces provide conditioned air from a central heating and cooling plant.

Table 97. 2019 Site EUI by End Use – Case Study 7. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
23%	0%	29%	3%	0%	8%	0%	32%	5%	**100%**

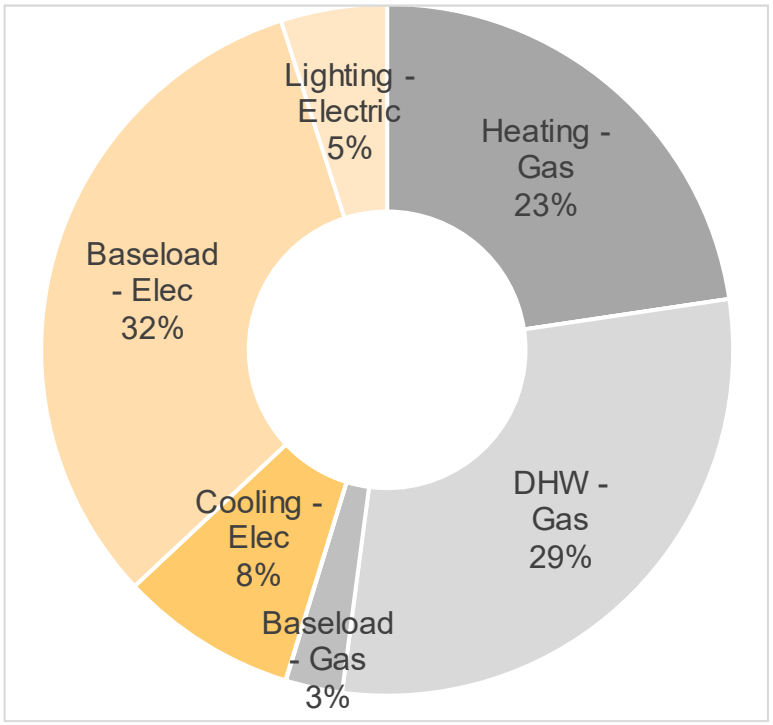

Figure 48. Site EUI Share (%) by End Use – Case Study 7

Target Determination

EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. Table 98 contains a breakdown of the space use targets for purposes of calculating the ZNC target. Other building uses are discussed below this table. The table also has an alternate target ("EE Standard"); the building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 98. Space Use Target Methodology Summary – Case Study 7

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (ZNC * Area%)
Hotel	Lodging	100%	175,000	57.8	75.7	57.8	75.7
Total	**-**	**100%**	**175,000**	**-**	**-**	**57.8**	**75.7**

In addition to the overall hotel space (i.e., rooms, corridors, the main lobby), other support areas are present such as a restaurant with kitchen and conference center. Most of these support areas are small (less than 5% of the overall building footprint).

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 99. ZNC and Interim Targets – Case Study 7

EUI Description	ZNC Target	ZNC Target
Baseline EUI	115 – 125	115 – 125
2026 – Interim Target 1	95 – 105	102 – 110
2030 – Interim Target 2	75 – 85	88 – 95
2035 – Target	57.8	75.7

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *EE Target Package* is based upon energy efficiency measures to reach the EE Target for this building. Note that the ZNC Target Package can also be used to reach the EE Target, but the EE Target Package reduces EUI only as far as needed to meet the EE Target.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

All costs are total costs for the measures, not incremental costs of equipment replacement as compared to a business as usual replacement schedule. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 100. EEM Package Summary – Case Study 7

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package	53 – 57	53%	$121,600	$5,959,000	48.9	2%
EE Target Package	72 – 76	38%	$138,200	$1,967,000	14.2	7%
Less-than-Five-Year Payback Package	94 – 102	19%	$99,800	$353,000	3.5	28%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 101 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 101. ZNC Target Package EEMs – Case Study 7. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert existing HVAC system to an electric heat pump system	17.8%	$19,900	$3,804,000	191.2	1%	18	5-10
2	Electrify Water Heating	Convert existing DHW system to electric DHW	18.5%	($11,300)	$1,270,000	N/A	N/A	15	5-10
3	Electrify Cooking	Convert gas cooking to electric cooking	1.0%	($6,000)	$11,000	N/A	N/A	10	Unknown (estimated 10 years)
4	Install ERV	Install an exhaust recovery ventilation unit	5.3%	$41,900	$432,000	10.3	10%	15	DNE
5	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	5.2%	$41,300	$88,000	2.1	47%	10	Unknown (estimated 10 years)
6	Wider Deadbands	Expand deadbands for central mechanical equipment	0.1%	$1,000	$3,000	2.6	39%	5	N/A
7	CW Pump VFDs	Install condenser water pump variable frequency drives	0.4%	$3,200	$27,000	8.4	12%	15	DNE
8	Finish LED Conversion	Complete ongoing LED conversion	0.2%	$1,200	$38,000	30.4	3%	15	5-10
9	Plug Load Management	Install smart plug load management tools	1.5%	$11,700	$17,000	1.5	67%	10	DNE
10	High-Efficiency Water Aerators	Install low flow aerators in hotel room faucets and showers	0.3%	$2,200	$10,000	4.6	22%	10	DNE
11	General Air Sealing	Air seal gaps in masonry, between window/wall sealing, doors, and other envelope	0.3%	$2,000	$31,000	15.6	6%	15	DNE
12	Solar PV	Install roof-mounted solar PV	1.8%	$14,500	$228,000	15.7	6%	15	N/A
Total			**52.4%**	**$121,600**	**$5,161,000**	**42.4**	**2%**	**-**	

Table 102. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 7

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	23%	0%	29%	3%	0%	8%	0%	32%	5%	**100%**
End Use Difference	-100%	0%	-100%	-100%	100%	-27%	100%	-26%	-12%	**48%**

EE Target Package

As some EE Target measures entail replacement of existing equipment, an additional column is added to Table 103 (on the following page) that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 103. EE Target Package EEMs – Case Study 7. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Partially Electrify Water Heating	Convert existing DHW system to electric DHW with gas backup	15.1%	($9,200)	$953,000	N/A	N/A	15	5-10
2	Install ERV	Install an exhaust recovery ventilation unit	6.9%	$42,600	$432,000	10.1	10%	15	DNE
3	Retro-commissioning	Retro-commission and implement improvements on central building systems	3.5%	$22,200	$61,000	2.7	37%	5	DNE
4	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	6.1%	$38,500	$88,000	2.3	44%	10	DNE
5	Wider Deadbands	Expand deadbands for central mechanical equipment	0.4%	$1,300	$3,000	2.3	52%	5	DNE
6	CHW Pump VFDs	Install chilled water pump variable frequency drives	0.4%	$2,900	$23,000	7.9	13%	15	DNE
7	CW Pump VFDs	Install condenser water pump variable frequency drives	0.4%	$3,500	$27,000	7.7	13%	15	DNE
8	HW Pump VFDs	Install hot water pump variable frequency drives	0.3%	$2,000	$8,000	4.0	26%	15	DNE
9	Air Handling Unit VFDs	Install air handling unit fan variable frequency drives	0.9%	$7,000	$48,000	6.9	14%	15	DNE
10	Finish LED Conversion	Complete ongoing LED conversion	0.2%	$1,200	$38,000	31.7	3%	15	5-10
11	Plug Load Management	Install smart plug load management tools	1.3%	$9,900	$17,000	1.7	57%	10	DNE
12	Low Flow Aerators	Install low flow aerators in hotel room faucets and showers	0.2%	$1,700	$10,000	5.9	17%	10	DNE
13	General Air Sealing	Air seal gaps in masonry, between window/wall sealing, doors, and other envelope	0.6%	$2,300	$31,000	13.5	7%	15	DNE
14	Solar PV	Install roof-mounted solar PV	1.6%	$12,300	$228,000	18.5	5%	15	DNE
Total			**37.8%**	**$138,200**	**$1,967,000**	**14.2**	**7%**	**-**	

Table 104: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for EE Target Package – Case Study 7

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-26%	0%	-82%	0%	-26%	-31%	0%	-37%	-17%	**62%**

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package allows the building to meet its first interim target threshold.

Table 105. Less-than-Five-Year Payback Package EEMs – Case Study 7. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

Measure #	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI	Equip. Life (yrs)
1	Retro-commissioning	Retro-commission and implement improvements on central building systems	4.9%	$24,600	$61,000	2.5	41%	5
2	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	8.4%	$42,500	$88,000	2.1	48%	10
3	Wider Deadbands	Expand deadbands for central mechanical equipment	0.5%	$1,400	$3,000	2.1	58%	5
4	CHW Pump VFDs	Install chilled water pump variable frequency drives	0.4%	$3,300	$23,000	7.0	14%	15
5	CW Pump VFDs	Install condenser water pump variable frequency drives	0.5%	$3,800	$27,000	7.1	14%	15
6	HW Pump VFDs	Install hot water pump variable frequency drives	0.3%	$2,300	$8,000	3.5	29%	15
7	Air Handling Unit VFDs	Install air handling unit fan variable frequency drives	0.7%	$5,200	$48,000	9.2	11%	15
8	Finish LED Conversion	Complete ongoing LED conversion	0.2%	$1,200	$38,000	31.7	3%	15
9	Plug Load Management	Install smart plug load management tools	1.4%	$11,100	$17,000	1.5	64%	10
10	Low Flow Aerators	Install low flow aerators in hotel room faucets and showers	0.7%	$1,800	$10,000	5.6	18%	10
11	General Air Sealing	Air seal gaps in masonry, between window/wall sealing, doors, and other envelope	0.7%	$2,600	$31,000	11.9	8%	15
	Total		**18.5%**	**$99,800**	**$354,000**	**3.5**	**28%**	**-**

Table 106. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 7

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	23%	0%	29%	3%	0%	8%	0%	32%	5%	**100%**
End Use Difference	-18%	0%	-16%	0%	-3%	-16%	0%	-24%	-17%	**-19%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

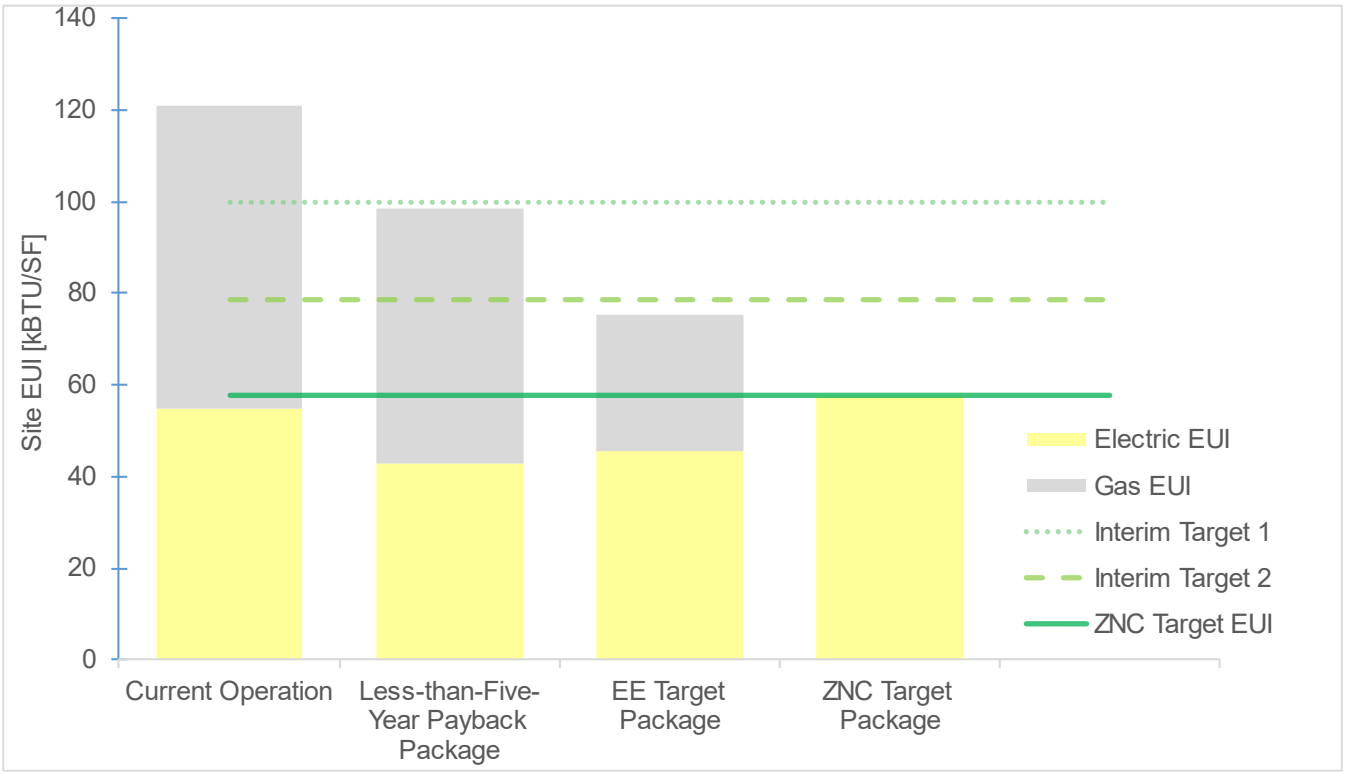

Figure 49. Target-to-Package Comparisons – Case Study 7

As seen in Figure 49, the Less-Than-Five-Year Payback Package results in a savings amount about equivalent to the first interim target. However, this package is still well short of the ZNC Target.

The EE Target Package does not fully electrify the building but does partially electrify some loads. As a result, electric use increases compared to the Less-Than-Five-Year Payback Package while gas use substantially decreases. This approach also gets the building below the 2nd interim target.

Building-Specific Technology Assessment

Given the large gas load at this building, electrification of primary loads-space heating, domestic hot water, cooking, and other similar base loads–are the main drivers behind the ZNC Target Package. These measures entail substantial renovations, but given the age of the mechanical system, a large-scale upgrade is likely during the next 10-15 years. As a result, electrification measures are the main energy savings driver in the ZNC Target Package.

Similarly, electrification of building loads needed to be evaluated for the EE Target. Although this is a comparatively smaller lift than the ZNC Target—on the order of 35% instead of 50%--this target cannot be reached without some amount of electrification.

Electrification considerations for this building are as follows:

- As noted above, electrification of all gas-fired loads is necessary in order to reach the ZNC Target. Electrifying all loads also represents a possible pathway to reaching the EE Target, although not a financially attractive one.
- Electrifying space heating would mean other measures to improve the building mechanical system could not be included in the EE Target Package. Since mechanical upgrades are typically more

common and offer better financial returns than domestic hot water or cooking upgrades, electrifying space heating was *not* included in the EE Target Package.
- *Completely* electrifying domestic hot water loads creates a slightly less attractive financial package than *partially* electrifying domestic hot water loads. In this partial electrification scenario, *only* enough electric DHW would be installed in order to meet the EE Target; the remaining capacity would be handled by gas systems. This also allows for backup gas systems to remain in case of emergency. The percentage of electrified systems was identified as described below.
- Electrifying cooking represents a rather small percentage of overall gas usage; other, more cost-effective measures can be used to reach the EE Target.

Once electrification measures were identified, then other measures to upgrade or optimize the building mechanical system were chosen. This includes items such as installing an ERV to lessen the heating and cooling load of the building. In this building, hotel guest room controls are applicable even with the system conversions so guest room controls were applied to all packages. Variable frequency drives (VFDs) were applied to mechanical systems that were not modified.

Following these mechanical system upgrades, other measures affecting building demand were applied (items like LED lighting conversions and high-efficiency aerators). These measures do not have a large overall impact on savings and were generally non-interactive in nature, meaning any resultant savings from these measures do not appreciably increase or decrease savings from other measures.

Lastly, roof-mounted solar PV is applied to the ZNC and EE Target Packages. In practice, solar PV needs to be coordinated with other measures that require roof space. A possible alternative method of ZNC compliance would be to expand solar PV to include a canopied PV system over the parking lot; however, based on the financial analysis done within this case study this is less financially advantageous than the package of measures chosen.

The Less-than-Five-Year Payback Package is largely constructed using similar measures as the ZNC Target Package with two notable exceptions:

- Retro-commissioning is applied to the existing systems only. Wholesale changeout of building mechanical systems would render any realized retro-commissioning savings irrelevant in the ZNC Target Package and so it was not included.
- Chilled Water Pump VFDs and Hot Water Pump VFDs are included in this package but not in the ZNC Target Package. The ZNC Target Package removes these loops from the building and instead includes a condenser water loop serving as the main building loop.

Once the Less-than-Five-Year Payback Package was constructed, measures for systems that remained were applied to the EE Target Package. These measures on their own were insufficient to reach the EE Target; in order to complete the EE Target Package, Solar PV (from the ZNC Target Package) and partial electrification of the DHW loop was applied. Electrifying approximately 80% of the DHW System was enough to reach the EE Target.

Package Comparisons

Reaching ZNC targets incurs a large overall cost to the property; most of these costs are borne from either electrification measures such as heat pump conversion or envelope measures such as air sealing and adding insulation. However, the ZNC target for this building is reachable with technologies available today.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital costs may be defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be effectively set aside to help cover parts of the costs.

- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. These funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The EE Target Package incurs less overall cost than the ZNC Target Package and higher cost savings.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible. It should be noted that with more retro-commissioning savings realized, the “Install ERV” measure (EEM 4 in the ZNC Target Package) be eligible for inclusion in the Less-than-Five-Year Payback Package.

Advances in technology between now and the ZNC target date may result in viable alternative approaches, meaning reductions in the ZNC costs and payback ranges described here. This applies primarily to envelope measures.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- Envelope: window and roof replacements were considered but ultimately not needed to meet the ZNC target and not cost-effective enough to include in the Less-than-Five-Year Payback Package.
- Canopy-mounted parking lot solar PV: while parking lot space here may allow for canopy-mounted solar PV, this is a much more expensive option than the roof-mounted solar PV approach chosen; this measure would displace other, more financially attractive measures.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building’s heating loads), and
    - Other measures’ applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the However, they may appear in the EE Target Package or Less-than-Five-Year Payback Package.

- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 107 below.

Table 107: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[60].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

[60] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 8: Standard Hotel without Extra Use Spaces

Building Information

This is a standard hotel without major extra use spaces such as conference centers. However, a restaurant and small retail space is on the premises. In addition, a covered parking garage serves the facility; its energy usage is on the electricity meter serving the building. Fan coil units are located in individual hotel rooms. Fresh air is provided to the hotel rooms via the hotel corridors; this air is pre-conditioned with exhaust air heat recovery systems.

Table 108. Building Characteristics – Case Study 8

Category	Building Information
Typology	Lodging
Square Footage	200,000 ft.^{2} – 225,000 ft.^{2} Hotel: 100%
Year Built	1990 – 1995
2019 ENERGY STAR Score	30 – 35
2019 Site EUI (kBTU/SF) (calculated for this study)	125 – 135

Building System Information

The basic building system information specific to the case study building is described below.

Table 109. Building System Information – Case Study 8

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	None – pneumatics installed on main equipment.	Electric	30 (estimated)	<5
Heating	Condensing HHW boilers feeding 4-pipe FCU system. Pumps original but have VFDs installed.	Gas (pumps, FCU motors electric)	2	20-25
Cooling	Chilled water; chillers about 30 years old. Cooling towers about 15 years old. No VFDs on CT fans.	Electric	30	<5
Ventilation	Semco heat recovery units serving corridors	Electric	10	10-15
DHW	Two sealed combustion hot water heaters	Gas (pumps, FCU motors electric)	12-14	5-10
Lighting	LED	Electric	2-3	5-10
Envelope	Largely unchanged in last 5-10 years	N/A	30 (estimated)	15-20
Metering	Centrally metered electric and gas	Electric, Gas	N/A	N/A

The building's energy usage type and estimated end uses are displayed below.

- Gas: used for heating hot water and domestic hot water usage primarily. An onsite restaurant also uses some gas (described in this report as base load), as does pool heating. 55% of the building's energy use is in the form of gas.
- Electricity: used for cooling, ventilation, lighting, and electric plug loads. 45% of the building's energy use is in the form of electricity. Fan coil units (FCUs) in hotel rooms and air handling units (AHUs) in common spaces provide conditioned air from a central heating and cooling plant. Parking lot lighting energy usage is included in this metric as it was not separately metered.

Table 110. 2019 Site EUI by End Use – Case Study 8. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
16%	0%	35%	4%	0%	8%	0%	33%	5%	**100%**

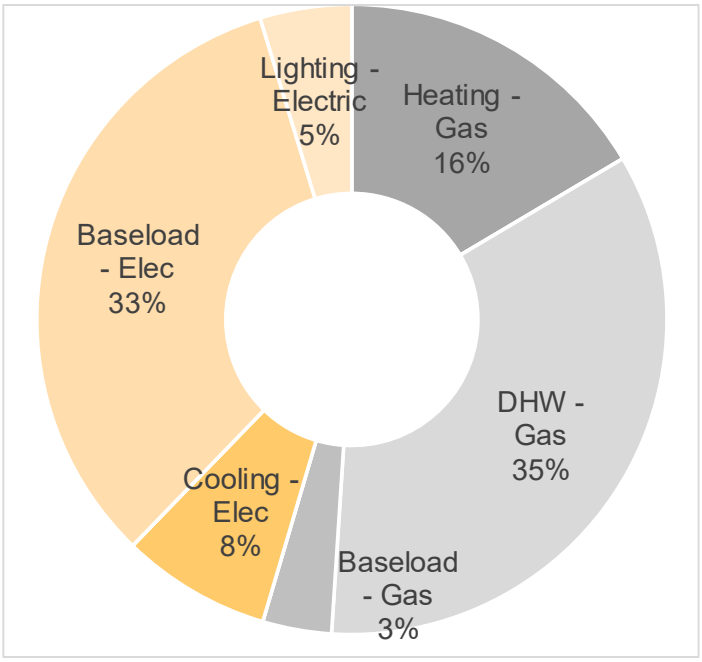

Figure 50. Site EUI Share (%) by End Use – Case Study 8

Target Determination

EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. The table also has an alternate target ("EE Standard"); the building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 111. Space Use Target Methodology Summary – Case Study 8

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (ZNC * Area%)
Hotel	Lodging	100%	225,000	57.8	75.7	57.8	75.7
Total	**-**	**100%**	**225,000**	**-**	**-**	**57.8**	**75.7**

In addition to the overall hotel space (i.e., rooms, corridors, the main lobby), other support areas are present such as a restaurant with kitchen, conference center, and above-ground covered parking. Most of these support areas are small (less than 5% of the overall building footprint), and parking is not included in any target-setting metrics.

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 112. ZNC and Interim Targets – Case Study 8

EUI Description	ZNC Target	EE Target
Baseline EUI	125 – 135	125 – 135
2026 – Interim Target 1	101 – 110	108 – 115
2030 – Interim Target 2	77 – 85	90 – 96
2035 – Target	57.8	75.7

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *EE Target Package* is based upon energy efficiency measures to reach the EE Target for this building. Note that the ZNC Target Package can also be used to reach the EE Target, but the EE Target Package reduces EUI only as far as needed to meet the EE Target.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 113. EEM Package Summary – Case Study 8

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
Final Target Package	53 – 57	56%	$209,600	$7,170,000	34.2	3%
EE Target Package	72 – 76	42%	$213,400	$2,105,000	9.9	10%
Less-than-Five-Year Payback Package	89 – 96	29%	$214,300	$751,000	3.5	29%

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 114 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 114. ZNC Target Package EEMs – Case Study 8. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating	Convert existing HVAC system to an electric heat pump system	11.5%	$4,400	$4,844,000	N/A	N/A	19	20-25
2	Electrify Water Heating	Convert existing DHW system to electric DHW	21.7%	($13,800)	$1,370,000	N/A	N/A	19	5-10
3	Electrify Cooking	Convert gas cooking to electric cooking	1.4%	($11,000)	$11,000	N/A	N/A	10	Unknown (estimated 10 years)
4	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	6.4%	$69,500	$112,000	1.6	62%	15	Unknown (estimated 5-10 years)
5	Pneumatic Conversion to DDC	Convert central plant pneumatics to DDC and calibrate/optimize system	8.9%	$96,000	$440,000	4.6	22%	15	<5
6	Recommission Heat Recovery	Recommission existing heat recovery ventilation system	2.2%	$23,400	$22,000	0.9	106%	5	N/A
7	Cooling Tower Fan VFDs	Install cooling tower fan variable frequency drives	0.4%	$3,900	$12,000	3.0	33%	15	DNE
8	Plug Load Management	Install smart plug load management tools	1.5%	$15,900	$22,000	1.4	72%	10	DNE
9	High-Efficiency Water Aerators	Install low flow aerators in hotel room faucets and showers	0.3%	$3,000	$11,000	3.7	27%	10	DNE
10	Solar PV	Install roof-mounted solar PV	1.7%	$18,300	$326,000	17.8	6%	15	DNE
Total			**56.2%**	**$209,600**	**$7,170,000**	**34.2**	**3%**	**-**	

Table 115. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 8

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	16%	0%	35%	4%	0%	8%	0%	33%	5%	**100%**
End Use Difference	-100%	0%	-100%	-100%	0%	-28%	0%	-34%	-23%	**44%**

EE Target Package

As some EE Target measures entail replacement of existing equipment, an additional column is added to Table 116 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 116. EE Target Package EEMs – Case Study 8. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Water Heating	Convert existing DHW system to electric DHW with gas backup	17.8%	($14,900)	$1,028,000	N/A	N/A	15	15-20
2	Install Free Cooling HX	Install a plate-and-frame heat exchanger to provide chilled water during cold ambient conditions	1.3%	$13,800	$107,000	7.8	13%	15	15-20
3	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	7.0%	$63,800	$112,000	1.8	57%	10	DNE
4	Pneumatic Conversion to DDC	Convert central plant pneumatics to DDC and calibrate/optimize system	9.6%	$88,100	$440,000	5.0	20%	5	0-5
5	Recommission Heat Recovery	Recommission existing heat recovery ventilation system	2.4%	$21,800	$22,000	1.0	99%	15	DNE
6	Cooling Tower Fan VFDs	Install cooling tower fan variable frequency drives	0.3%	$3,700	$12,000	3.2	31%	15	DNE
7	Air Handling Unit VFDs	Install air handling unit fan variable frequency drives	0.3%	$2,700	$25,000	9.1	11%	10	DNE
8	Plug Load Management	Install smart plug load management tools	1.4%	$14,800	$22,000	1.5	67%	15	DNE
9	Low Flow Aerators	Install low flow aerators in hotel room faucets and showers	0.2%	$2,500	$11,000	4.5	22%	10	DNE
10	Solar PV	Install roof-mounted solar PV	1.6%	$17,000	$326,000	19.2	5%	15	DNE
Total			**41.8%**	**$213,300**	**$2,105,000**	**9.9**	**10%**	**-**	

Table 117: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for EE Target Package – Case Study 8

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-27%	0%	-82%	0%	0%	-40%	0%	-39%	-23%	**58%**

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package allows the building to meet its first interim target threshold.

Table 118. Less-than-Five-Year Payback Package EEMs – Case Study 8. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Install Free Cooling HX	Install a plate-and-frame heat exchanger to provide chilled water during cold ambient conditions	1.3%	$13,800	$107,000	7.8	13%	15
2	Guest Room Controls	Add automatic guest room controls to limit extra energy usage during unoccupied times	9.3%	$64,500	$112,000	1.7	57%	15
3	Pneumatic Conversion to DDC	Convert central plant pneumatics to DDC and calibrate/optimize system	12.9%	$89,100	$440,000	4.9	20%	10
4	Recommission Heat Recovery	Recommission existing heat recovery ventilation system	2.4%	$21,800	$22,000	1.0	99%	5
5	Cooling Tower Fan VFDs	Install cooling tower fan variable frequency drives	0.3%	$3,700	$12,000	3.2	31%	15
6	Air Handling Unit VFDs	Install air handling unit fan variable frequency drives	0.4%	$4,000	$25,000	6.1	16%	15
7	Plug Load Management	Install smart plug load management tools	1.4%	$14,700	$22,000	1.5	67%	10
8	Low Flow Aerators	Install low flow aerators in hotel room faucets and showers	0.7%	$2,600	$11,000	4.2	24%	15
	Total		**28.7%**	**$214,200**	**$751,000**	**3.5**	**29%**	**-**

Table 119. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 8

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	16%	0%	35%	4%	0%	8%	0%	33%	5%	**100%**
End Use Difference	-27%	0%	-25%	0%	0%	-40%	0%	-34%	-23%	**71%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

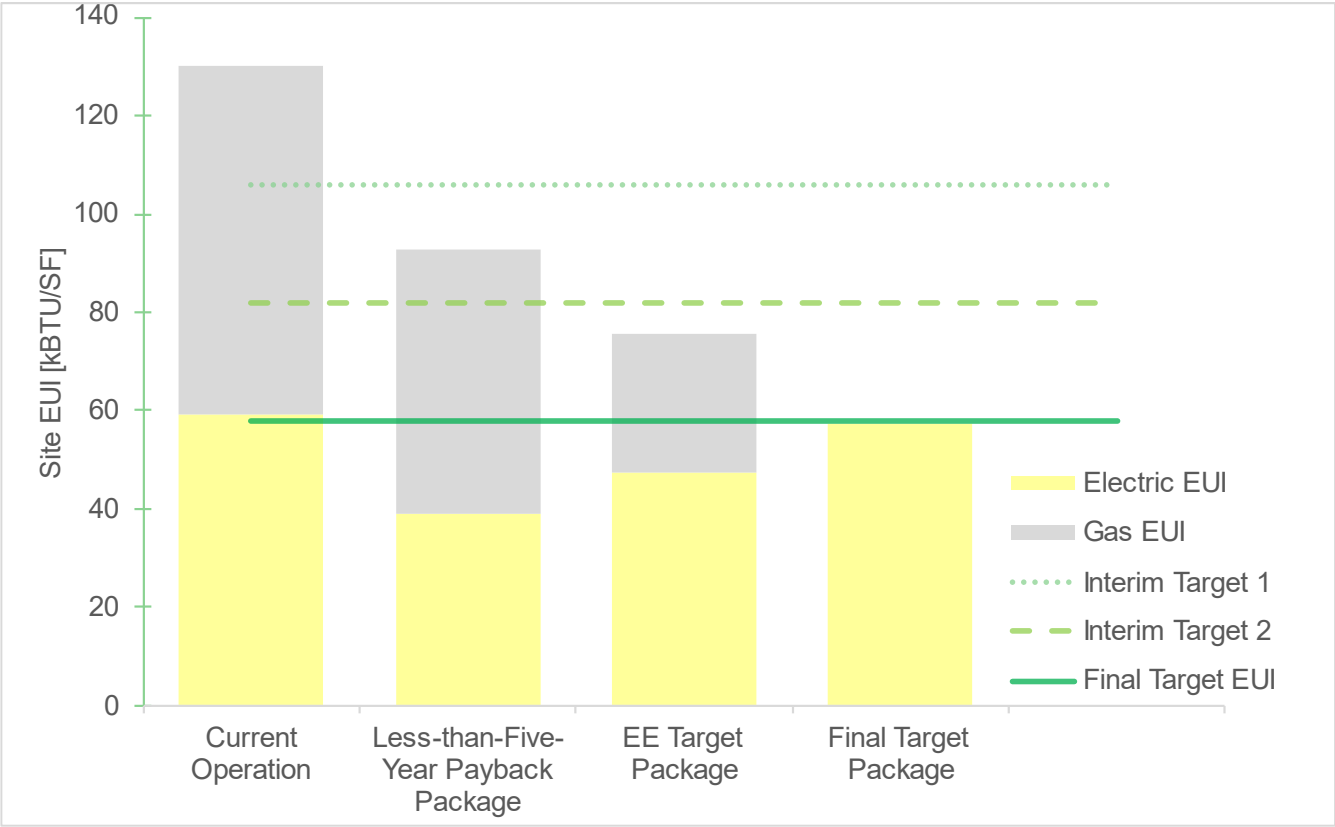

Figure 51. Target-to-Package Comparisons – Case Study 8

As seen in Figure 51, the Less-Than-Five-Year Payback Package results in a savings amount approximate to the first interim target.

The EE Target Package does not fully electrify the building but does partially electrify some loads. As a result, electric use increases compared to the Less-Than-Five-Year Payback Package while gas use substantially decreases. This approach also gets the building below the 2nd interim target.

Building-Specific Technology Assessment

This hotel has a large gas load which is dominated by domestic hot water use. In addition, this hotel has a central control system which is a large source of building inefficiencies.

Given the large gas load at this building, electrification of primary loads-mechanical heating and cooling, domestic hot water, cooking, and other similar base loads–are the main drivers behind the ZNC Target Package. These measures entail substantial renovations, but given the age of the mechanical system, a large-scale upgrade is likely during the next 10-15 years. As a result, electrification measures are included in the ZNC Target Package.

Similarly, electrification of building loads needed to be evaluated for the EE Target. Although this is a comparatively smaller lift than the ZNC Target—on the order of 40% instead of 55%--this target cannot be reached without some measure of electrification.

Electrification considerations for this building are as follows:

- As noted above, electrification of all gas-fired loads is necessary in order to reach the ZNC Target. Electrifying all loads also represents a possible pathway to reaching the EE Target, although not a financially attractive one.
- Electrifying space heating would mean other measures to improve the building mechanical and controls systems could not be included in the EE Target Package. Since mechanical upgrades are typically more common and offer better financial returns than domestic hot water or cooking upgrades, electrifying space heating was *not* included in the EE Target Package.
- *Completely* electrifying domestic hot water loads creates a slightly less attractive financial package than *partially* electrifying domestic hot water loads. In this partial electrification scenario, *only* enough electric DHW would be installed in order to meet the EE Target; the remaining capacity would be handled by gas systems. This also allows for backup gas systems to remain in case of emergency. The percentage of electrified systems was identified as described below.
- Electrifying cooking represents a rather small percentage of overall gas usage; other measures can be used to reach the EE Target.

For this building, converting the existing fan coil system to a water-source heat pump system gains the benefit of reusing existing piping risers compared to other electrification conversion technology (i.e., VRF) which entails entirely new piping runs throughout the building.

Some alternative approaches were reviewed:

- Aiming for efficiency gains from existing equipment is not realistic based on technology available today. In effect, gas-fired equipment needs to approach or exceed 100% efficiency in order to be in range of the ZNC target. While some optimization methods can help and do appear in the Less-than-Five-Year Payback Package, they do not cover this energy gap.
- More efficient similar system types have the same issues. While—for example—replacement of aged chillers with new chillers would generate substantial chilled water savings, it does not solve the issue around gas usage as described above.

Once electrification measures are completed, other measures to improve building controls were chosen, including advanced guest room controls and converting the existing pneumatic control system to direct digital controls (DDC). Pneumatic controls are old, inefficient mechanical system controls that use compressed air to start and stop equipment and control critical points such as space temperature. However, they require frequent calibration (recommended every six months) and are prone to failure. Direct digital controls use electronic devices and control signals to control mechanical equipment; these require less frequent calibration, are more accurate, and allow for more advanced, energy savings control. Because the system upgrades undertaken for electrification leave some piping and pumping in place, upgrading these controls to DDC are necessary to realize the total system benefit.

Smaller but still significant mechanical optimization measures such as recommissioning the existing heat recovery system and installing VFDs on fans were chosen.

Following these mechanical system upgrades, other measures affecting building demand were applied (items like LED lighting conversions and high-efficiency aerators). These measures do not have a large overall impact on savings and were generally non-interactive in nature, meaning any resultant savings from these measures do not appreciably increase or decrease savings from other measures.

Lastly, roof-mounted solar PV is applied to the ZNC and EE Target Packages. In practice, solar PV needs to be coordinated with other measures that require roof space.

The Less-than-Five-Year Payback Package and EE Target Package uses similar measures as the ZNC Target Package with a handful of exceptions or changes:

- Installing a free cooling heat exchanger (HX) is viable for a chilled water plant system, but not viable if the building is converted to a heat pump loop. Free cooling heat exchangers use water as a medium to remove heat from the building without the use of electricity or other fuels when ambient conditions are cool enough; this can result in substantial energy savings in buildings requiring cooling during colder months.
- Pneumatic Conversion with DDC assumed the central plant and primary air handling units would also be converted from their existing pneumatics to DDC. Pneumatic controls operate equipment in the building (usually key mechanical equipment) but are a much older type of control system that frequently falls out of calibration, generating energy waste. DDC controls eliminate this issue.
- Air Handling Unit Fan VFDs apply to the Less-than-Five-Year Payback Package and EE Target Package, but not the ZNC Target Package; electrifying space heating in the ZNC Target Package would replace these air handling units.

Package Comparisons

Most energy cost savings with this building are achieved with the Less-than-Five-Year Payback Package. This is due to two factors:

- Most equipment at the building is running relatively inefficiently, most notably the regular presence of pneumatic controls. Removal of these controls and addition of direct digital (DDC) controls drives a large portion of both total cost and total savings.
- Electrification measures have high costs. Based on the usage profile of this hotel, large-scale electric conversion of domestic hot water and cooking incur not only upgrade costs, but also higher energy costs.

Reaching ZNC targets incurs a large overall cost to the property; most of these costs are borne from either electrification measures such as heat pump conversion or envelope measures such as air sealing and adding insulation. However, the ZNC target for this building is reachable with technologies available today.

The EE Target Package incurs less overall cost than the ZNC Target Package and higher cost savings.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital costs may be defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be effectively set aside to help cover parts of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today on three-year cycles. The program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

Note that some of the differences between savings amounts reflected in the different packages (most notably the pneumatic conversion to DDC) are dependent on existing or replaced technology. Specifically, if the mechanical system is converted to a heat pump system, the chilled water plant will not be needed and no savings will be realized.

Advances in technology between now and the ZNC target date may result in other viable approaches, meaning reduction in the ZNC costs and payback ranges described here. This applies primarily to envelope measures.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- Envelope: window and roof replacements were considered but ultimately unneeded to meet the ZNC target and not cost-effective enough to include in the Less-than-Five-Year Payback Package.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the However, they may appear in the EE Target Package or Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 120.

Table 120: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[61].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

[61] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 9: Worship/Education Mixed-Use

This is a multi-function building that acts as a worship facility, school, and gathering place. The facility was built in two phases. The old building houses mostly school spaces. Space uses are generally divided across the new and old building. Similarly, the mechanical and other building systems are largely separate between the old building and the addition, with the exception of the outdoor air system which is shared across both buildings.

This case study distinguishes measures between the old and new buildings, as specific measures may only be applicable to specific parts of the building. This type of approach would be common in buildings that have substantially different types of building systems in additions.

Table 121. Building Characteristics – Case Study 9

Category	Building Information
Typology	Worship/Education
Square Footage	75,000 ft.^{2} – 100,000 ft.^{2} School: 50% Religious Worship: 50%
Year Built	1995 – 2005 (old building) 2005 – 2015 (new addition)
2019 ENERGY STAR Score	30 – 35
2019 Site EUI (kBTU/SF) (calculated for this study)	80 – 90

Building System Information

The basic building system information specific to the case study buildings are described below.

Table 122. Building System Information – Case Study 9

Category	Type	Fuel	Approximate Equipment Age (Years)	Expected End of Useful Life (Years)
Central BMS	Building automation system in the new building No central controls in the old building	Electric	10 (new) N/A (old)	5-10 (new); <5 (old)
Heating	Gas-fired boilers (primary) in new building WSHP with electric boiler backup in old building	Electric/Gas	10 (new) 20 (old)	10-15 (new) 5-10 (old)
Cooling	Chilled water in new building WSHP in old building	Electric	10 (new) 20 (old)	10-15 (new) <5 (old)
Ventilation	ERVs in new building; through-wall ventilation in old building. ERVs and some AHUs serve some old building spaces	Electric	10 (new) 20 (old)	5-10 (new) <5 (old)
DHW	Unitized electric DHW for both buildings	Electric	10 (new) 20 (old)	10-15 (new) 5-10 (old)
Lighting	Converted to LED in 2016 (including parking lot spaces)	Electric	5	5 – 10
Envelope	Largely unchanged in last 5-10 years	N/A	10 (new) 20 (old)	30-40
Metering	One electric and one gas meter for both buildings	Electric, Gas	N/A	N/A

The buildings' energy usage type and estimated end use are displayed below.

- Gas: used for heating hot water in the new building only. Forty percent of the building's energy usage is in the form of gas.
- Electricity: used for cooling and heating in the old building; ventilation, lighting, and electric plug loads. Sixty percent of the building's energy use is in the form of electricity.

Table 123. 2019 Site EUI by End Use – Case Study 9. Components may not sum to 100% due to rounding.

Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
40%	0%	0%	0%	6%	10%	1%	37%	7%	**100%**

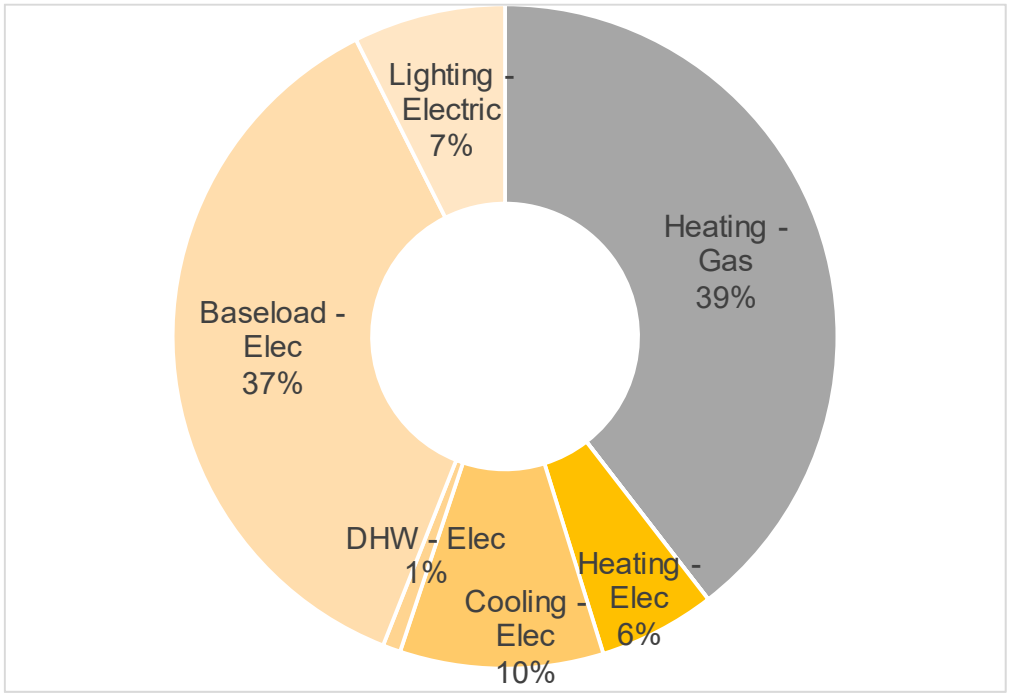

Figure 52. Site EUI Share (%) by End Use – Case Study 9

Target Determination

EUI targets are determined by a weighted average of applicable ZNC targets per space use type. Space use types are provided in Portfolio Manager and via reviews of available drawings. The table also includes an alternate “EE Standard” target. The building will need to take action in order to meet both the ZNC and EE Targets. All the following analysis uses the ZNC target.

Table 124. Space Use Target Methodology Summary – Case Study 9

Specific Space Type	Space Type Group	Area %	Floor Areas	ZNC Standard [Site EUI]	EE Standard [Site EUI]	Weighted ZNC EUI (ZNC * Area%)	Weighted EE EUI (ZNC * Area%)
K-12 School	Education – K-12 School	50%	50,000	36.0	47.1	26.0	24.3
Worship Facility	Religious Worship	50%	50,000	36.9	48.8	10.2	23.6
Total	**-**	**100%**	**100,000**	**-**	**-**	**36.2**	**47.9**

The baseline EUI is derived from whole building 2019 utility data over whole building square footage.

Table 125. ZNC and Interim Targets – Case Study 9

EUI Description	ZNC Target	ZNC Target
Baseline EUI	80 – 90	80 – 90
2026 – Interim Target 1	65 – 72	70 – 77
2030 – Interim Target 2	50 – 56	59 – 64
2035 – Target	36.4	47.9

Package Overview

EEM packages were compiled based on existing technology for two scenarios:

- *ZNC Target Package* is based upon electrification and energy efficiency measures to reach the ZNC Target for this building.
- *EE Target Package* is based upon energy efficiency measures to reach the EE Target for this building. Note that the ZNC Target Package can also be used to reach the EE Target, but the EE Target Package reduces EUI only as far as needed to meet the EE Target.
- *Less-than-Five-Year Payback Package* is based on the results of a package that would have a simple payback of less than five years, not accounting for supplemental funding tools such as utility incentives or tax credits.

All costs are total costs for the measures, not incremental costs. These costs do not include applicable incentives. The following table offers a financial overview of these packages.

Table 126. EEM Package Summary – Case Study 9

Package	Package EUI (kBTU/ft.^{2}/yr)	% Site EUI Savings	Cost Savings ($/yr.)	Capital Costs ($)	SP (yrs)	ROI (%)
ZNC Target Package (Option 1)	33 – 36	55%	$80,800	$3,062,000	37.9	3%
ZNC Target Package (Option 2)	33 – 36	56%	$155,300	$2,445,000	15.7	6%
EE Target Package	45 – 48	42%	$105,700	$1,400,000	13.3	8%
Less-than-5-year Payback Package	72 – 81	10%	$18,800	$53,000	2.8	35%

Note that for the ZNC Target Package, SWA determined that two packages were viable based on energy savings and applicability to this building. This case study contains the results of both of these packages.

ZNC Target Package

As some ZNC Target measures entail replacement of existing equipment, an additional column is added to Table 127 and Table 129 that shows the estimated remaining life of the equivalent replacement system. An "N/A" indicates the existing system is not replaced, and a "DNE" means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 127. ZNC Target Package EEMs – Case Study 9, Option 1. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Electrify Space Heating (new bldg.)	Convert existing gas heating system in the old building to an electric heat pump system	27.7%	$2,600	$978,000	369.0	0%	15	10 – 15
2	Install ERV (old bldg.)	Install a dedicated outdoor air system with heat recovery capabilities in the old building	3.6%	$12,600	$114,000	9.0	11%	15	DNE
3	Retro-commissioning (new building)	Retro-commission and implement improvements on central building systems for the new building	2.7%	$7,500	$16,000	2.1	48%	5	N/A
4	Retro-commissioning (old building)	Retro-commission and implement improvements on central building systems for the old building	2.7%	$7,300	$16,000	2.2	46%	5	N/A
5	Loop Pump VFDs (old bldg.)	Install VFDs on the loop pumps for the old building	0.9%	$2,500	$21,000	8.7	12%	15	DNE
6	Solar PV	Install roof-mounted solar PV and some canopy-mounted solar PV over the parking lot	17.5%	$48,200	$1,918,000	39.8	3%	15	DNE
Total			**55.1%**	**$80,700**	**$3,063,000**	**37.9**	3%	**-**	

Table 128. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 9, Option 1.

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	40%	0%	0%	0%	6%	10%	1%	37%	7%	**100%**
End Use Difference	-100%	0%	0%	0%	170%	-16%	-8%	-63%	-8%	**45%**

Table 129. ZNC Target Package EEMs – Case Study 9, Option 2. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Retro-commissioning (new building)	Retro-commission and implement improvements on central building systems for the new building	5.1%	$8,200	$16,000	1.9	53%	5	N/A
2	Retro-commissioning (old building)	Retro-commission and implement improvements on central building systems for the old building	2.9%	$16,200	$16,000	1.0	102%	5	N/A
3	Loop Pump VFDs (old 172ldg.)	Install VFDs on the loop pumps for the old building	0.9%	$2,600	$21,000	8.3	12%	15	DNE
4	Solar PV	Install roof-mounted solar PV and canopy-mounted solar PV over the parking lot	46.6%	$128,300	$2,392,000	18.6	5%	15	DNE
Total			**55.6%**	**$155,300**	**$2,445,000**	**15.7**	**6%**	**-**	

Table 130. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for ZNC Target Package – Case Study 9, Option 2.

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	40%	0%	0%	0%	6%	10%	1%	37%	7%	**100%**
End Use Difference	-8%	0%	0%	0%	-86%	-86%	-86%	-87%	-86%	**44%**

EE Target Package

As some EE Target measures entail replacement of existing equipment, an additional column is added to Table 131 that shows the estimated remaining life of the equivalent replacement system. An “N/A” indicates the existing system is not replaced, and a “DNE” means does not exist and the package adds a system or piece of equipment not currently onsite. This is discussed in more detail in the Case Study Measures Identification Methodology section below.

Table 131. EE Target Package EEMs – Case Study 9. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)	Estimated Remaining Life of Equivalent System (yrs)
1	Install ERV (old bldg.)	Install a dedicated outdoor air system with heat recovery capabilities in the old building	3.6%	$9,900	$114,000	11.5	9%	15	15-20
2	Retro-commissioning (new building)	Retro-commission and implement improvements on central building systems for the new building	5.1%	$8,200	$16,000	1.9	52%	5	15-20
3	Retro-commissioning (old building)	Retro-commission and implement improvements on central building systems for the old building	3.7%	$7,400	$16,000	1	47%	5	DNE
4	Loop Pump VFDs (old bldg.)	Install VFDs on the loop pumps for the old building	0.9%	$2,500	$21,000	8.7	11%	15	DNE
5	Solar PV	Install roof-mounted solar PV and some canopy-mounted solar PV over the parking lot	28.2%	$77,700	$1,234,000	15.9	6%	15	DNE
Total			**41.5%**	**$105,700**	**$1,401,000**	**13.3**	**8%**	**-**	

Table 132: Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for EE Target Package – Case Study 9

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	46%	0%	16%	6%	0%	5%	0%	24%	3%	**100%**
End Use Difference	-12%	0%	0%	0%	-61%	-62%	-58%	-61%	-58%	**58%**

Less-than-Five-Year Payback Package

The Less-than-Five-Year Payback package allows the building to meet its first interim target threshold.

Table 133. Less-than-Five-Year Payback Package EEMs – Case Study 9. All costs are total capital cost estimates without incentives and without subtracting the cost of replacing existing systems at end of life.

#	Measure	Description	Whole Bldg. EUI Svgs. (%)	Cost Savings ($/yr.)	Measure Cost ($)	SP (yrs)	ROI (%)	Equip. Life (yrs)
1	Retro-commissioning (new building)	Retro-commission and implement improvements on central building systems for the new building	5.1%	$8,200	$16,000	1.9	52%	5
2	Retro-commissioning (old building)	Retro-commission and implement improvements on central building systems for the old building	2.9%	$8,000	$16,000	2.0	50%	5
3	Loop Pump VFDs (old bldg.)	Install VFDs on the loop pumps for the old building	0.9%	$2,600	$21,000	8.3	12%	15
	Total		**8.9%**	**$18,800**	**$53,000**	**2.8**	**35%**	**-**

Table 134. Post Retrofit Site EUI by End Use & Percent Reductions from Baseline for Less-than-Five-Year Payback Package – Case Study 9

Project	Heating – Gas	Cooling – Gas	DHW – Gas	Baseload – Gas	Heating – Electric	Cooling – Electric	DHW – Electric	Baseload – Electric	Lighting – Electric	Total EUI
Baseline	40%	0%	0%	0%	6%	10%	1%	37%	7%	**100%**
End Use Difference	-8%	0%	0%	0%	-8%	-8%	-8%	-11%	-8%	**91%**

Package Comparisons to ZNC Target

The following chart shows the site EUI and split between fuels today and for the EEM packages in comparison to the three Targets.

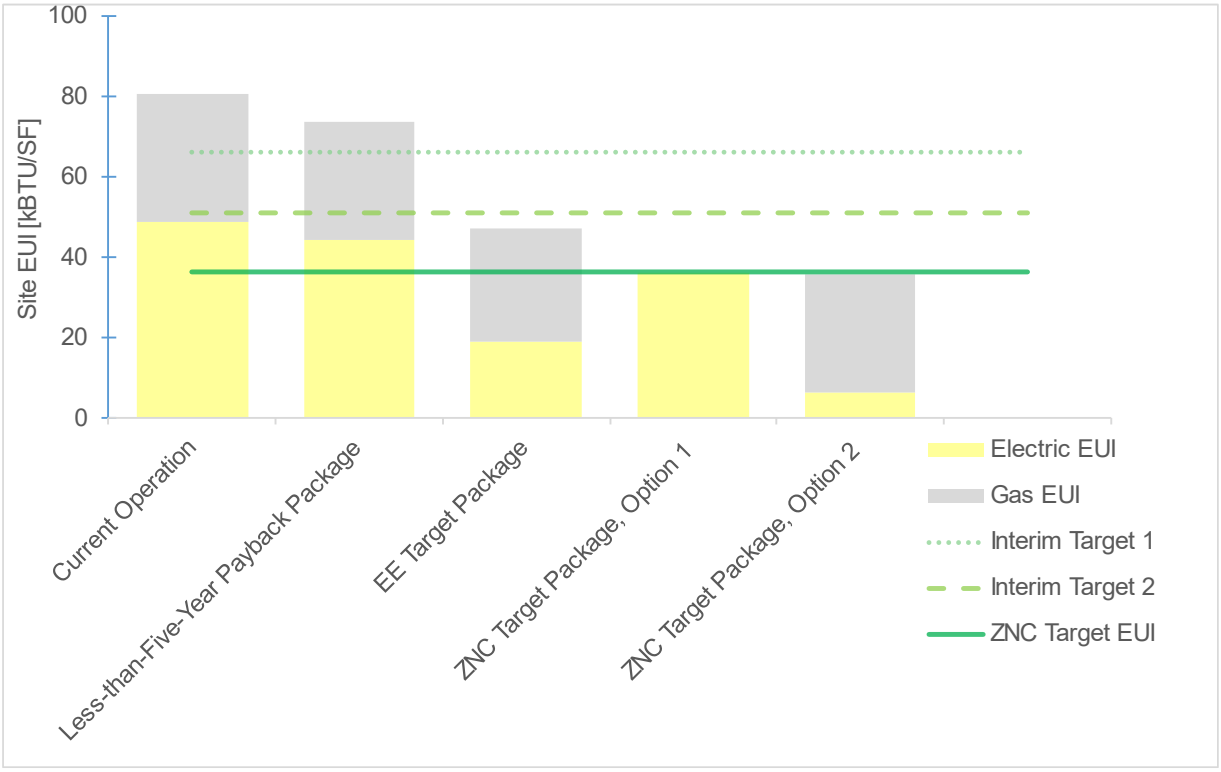

Figure 53. Target-to-Package Comparisons – Case Study 9

As referenced above, both ZNC Target Packages do reach ZNC. However, while one ZNC Target Package reaches the target via electrification, the other package reaches the target through extensive use of solar PV.

The EE Target Package is similar in approach to the ZNC Target Package, Option 2 and looks similar in Figure 53 as a result. However, less solar PV is required to meet the EE Target. This approach also gets the building below the 2nd interim target.

Building-Specific Technology Assessment

This building has multiple uses, varied operating hours, and different mechanical systems across the old and new areas of the building. As a result, addressing building systems needs to consider unique solutions per building wing.

The only item to electrify is the heating hot water loop in the new building. An ERV can also be installed on the old building, and retro-commissioning can be applied to both wings of the building. This represents a reasonable first pass at predominantly mechanical system measures to reach ZNC.

Alternatively, this building is relatively flat compared to its total square footage with a high roof to total square footage ratio, and it also has a large parking lot. Given both of these features, the site is a natural candidate for solar PV.

Current electric demand can be met by solar PV. Additional solar PV is physically possible on additional available roof space and extra parking lot space If approximately 40% of the parking lot is covered in PV, the site can reach satisfy all onsite electricity needs without electrifying the hot water loop.

Since this building was unique among the case study buildings in having two reasonably obvious options for reaching the ZNC Target, both options were presented.

Similar methodology was used to create the EE Target Package as the ZNC Target Package, Option 2. However, less solar PV would be required to meet the EE Target. This also implies that midpoints between the ZNC and EE Targets could be satisfied using different amounts of solar PV.

Following electrification and solar PV consideration, other measures affecting building demand were chosen such as distribution loop pump VFDs. These measures do not have a large overall impact on savings and were generally non-interactive in nature meaning savings from these measures do not appreciably increase or decrease savings from other measures.

The Less-than-Five-Year Payback Package is constructed using applicable measures from either ZNC Target Package.

Package Comparisons

Reaching ZNC targets incur a large overall cost to the property; most of these costs are borne from either electrification measures such as heat pump conversion or solar PV. However, the ZNC target for this building is reachable with technologies available today.

There are some ways to reduce compliance retrofit costs:

- Some of the total capital costs may be defrayed by accounting for avoided replacement costs of existing mechanical equipment. For example, most mechanical equipment will likely be replaced before the 2035 target. This money can be effectively set aside to help cover parts of the costs.
- Financing methods such as the Montgomery County Green Bank are viable.
- Utility incentives through the EmPOWER Maryland program may help offset upfront costs. While not a significant amount relative to the overall project investment, these funds are available today. These funds are available on three-year cycles and the program offerings can change during the program cycle; based on this, incentive estimates are not included in this report.

The EE Target Package incurs less overall cost than the ZNC Target Package and higher cost savings.

The Less-than-Five-Year Payback Package largely utilizes retrofits to existing equipment. Applying a higher estimated savings for retro-commissioning may be possible.

Measures Not Recommended

Measures reviewed for the building but not included in the EEM package are described below.

- Building controls: while adding controls to the old building HVAC system may result in savings, this was not deemed as necessary to meet ZNC in either of the approaches taken.
- DHW: domestic hot water is a minimal load and was not examined.
- Envelope: Window and roof replacements were considered but ultimately unneeded to meet the ZNC target and are not cost-effective enough to include in the Less-than-Five-Year Payback Package.

General Methodology Applied to All Case Studies

The following text describes components of this technical analysis that were applied to all case studies about EEM Package Development, Building Desktop Audits, and Utility Rates. After those sections are discussions of the analysis methodology applied specifically to this case study.

EEM Package Development

Three packages of EEMs were developed.

Zero Net Carbon-Compatible (ZNC) Target Package

This package compiles measures necessary to meet the Zero Net Carbon-Compatible target for the respective building. These measures typically include electrification of natural gas uses. The aim of this package was to create a series of measures that result in the ability of the case study building to meet the ZNC target. Project financials were not a primary driver, but financially desirable measures were included wherever possible.

Descriptions of each package are included in the individual case studies below.

The methodology for developing these packages was generally as follows:

- Potential electrification measures were implemented first when determined they were necessary to meet the ZNC target. This was done for two reasons:
    - Electrified end uses were typically large (i.e., all of a building's heating loads), and
    - Other measures' applicability may change based on these electrified systems. Note that for packages where mechanical systems were changed, some measures that are appropriate based on *existing mechanical equipment* may not be included in the ZNC package. However, they may appear in the However, they may appear in the EE Target Package or Less-than-Five-Year Payback Package.
- Next, measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Energy Efficiency (EE) Target Package

This package compiles measures necessary to meet the Energy Efficiency target for the respective building. Initial analysis returned multiple ways to think about developing an approach, each with pros and cons. These can be found in Table 135 below.

Table 135: General approaches to developing an EE Target Package.

Package Type	Pros	Cons	Other Items
Fewest Measures	• Simplest to implement • Easiest to understand	• Higher cost and lower ROI	• Electrification of some end uses guaranteed
Best ROI that Meets the EE Target	• Most attractive financial package • Best speaks to financial concerns	• Still will electrify some loads • Better ROI may not be the easiest to implement measures	• This will likely introduce partial electrification of end uses to the study
Minimize Electrification	• Best speaks to the theory behind the EE package	• Would necessitate replacement of gas-fired equipment with new gas-fired equipment	• May not really be viable with case study buildings (but could be viable with other buildings)

This study opted to use the Best ROI that Meets the EE Target approach. The following guidelines apply to this approach:

- Electrification of end uses needed to be considered in practice. Most case study buildings were far enough away from the EE Target that reaching the EE Target without electrification was infeasible without significant occupant energy pattern changes[62].
- Electrification of DHW loads was considered first. Most mechanical systems (which include space heating systems) have low-cost opportunities for optimization while most DHW systems have limited optimization opportunities. This means the combined mechanical system optimization measures plus DHW electrification had a more attractive ROI than space heating electrification measures.
- Mechanical system optimization and retro-commissioning measures were then implemented.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Electrification of space heating loads was considered only if electrification of DHW loads was not enough in conjunction with other measures to meet the EE Target *and* minimal system optimization was possible.
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.

Less-than-Five-Year Payback Package

This package compiles a set of measures that results in a five year or less total simple payback. This package represents a reasonable approximation of possible outcomes from an energy audit. These measure packages represent the types of low cost and lower-savings measures often recommended during standard energy audits. These measures are often investigated by buildings first. Note that an energy audit may include other financial tools such as utility incentives, tax deductions/credits, or other assistance, which were not included in this technical analysis.

Where applicable, measures from the Less-than-Five-Year Payback Package were also applied to the ZNC Package. The methodology described under the ZNC Target Package applied to the Less-than-Five-Year Payback Package as well. The following guidelines apply to the Less-than-Five-Year Payback Package:

- Measures with large interactive effects were reviewed. These measures were typically either mechanical or controls-based in nature.
- Retro-commissioning was applied; see below for details.
- Next, smaller end use reduction measures with limited interactive effects were implemented. These measures typically have a small impact (i.e., less than 5% of overall building usage).
- Lastly, where applicable and necessary, photovoltaic solar (PV) was applied.
- Major building systems were *not* modified in this package. Most system conversions (for example, converting from chilled water to water-source heat pumps) have longer paybacks and would not realistically be included. However, this also means that measures that impact *existing mechanical equipment* would appear here (for example, chilled water pump VFDs when the ZNC Target Package converted a building from chilled water to water-source heat pumps).
- New fossil fuel measures were not included.
- Overall energy savings were not a primary goal of this target; the energy savings resulting from this package was simply the end result of measures that would result in a less than five year project payback for all measures considered.

Typically, this package may be useful in reviewing progress toward interim targets.

Note that for some newer buildings that have less opportunity for low-cost incremental savings, the Less-than-Five-Year Payback Package may be either small or non-existent.

[62] Energy conservation by occupants can drive significant energy savings (EPA, slide 33). Because of the difficulty in predicting savings (and the persistence of savings) for these sorts of behavioral measures in typical buildings, those savings are not included in this study.

Building Desktop Audits

Case studies were developed through interviews with building managers and site staff to collect – for major equipment only – equipment type, equipment age, operating parameters, types of fuel used for various end uses, information on recent capital upgrades, and any comments on plans for future upgrades and decision-making processes in relation to energy management. Architectural and mechanical drawings and supporting documentation were reviewed when available.

Desktop audits were performed in order to develop the case studies contained in this report. Desktop audits use information provided from building owners and operators to develop recommendations, but do not contain any onsite observations. This methodology is effective for informing policy-level decisions as it can effectively capture broad-stroke approaches; however, this methodology does not tend to capture measures are more limited in impact (e.g., mechanical systems that only serve part of the building). Applicability of desktop audit measures to a specific building typically requires some amount of onsite investigation in order to determine applicability of measures for any specific building in a given typology. This technical analysis is limited to desktop audits and measure recommendations are limited to what could be recommended based on the data collected by the auditor.

Where possible, supplemental energy audit information performed by others is incorporated into the case studies. These energy audits, which may contain onsite observations, were completed prior to this desktop audit process.

Utility Rates

Utility rate assumptions are $0.129 per kWh and $1.228 per therm, based on the US Energy Information Administration (EIA) average rates for the area. While energy rates differ by service class and usage profile, these rates are assumed to represent the average costs for these types of buildings in Montgomery County. These rates are meant to be inclusive of taxes and fees applicable throughout the state, including the current Fuel Energy Tax of $0.01978 per kWh on electricity and $0.17026 per therm on natural gas use.

Case Study 10: Retail

No retail candidate elected to participate in the case studies.

The analysis team searched for a retail case study that met specific criteria (e.g., EUI was above the ZNC target, roughly the 30th percentile, for that buildings group, larger single retailer already benchmarking in Portfolio Manager and reporting to Montgomery County, would be covered under the amended building definition), but were unable to identify an appropriate case study candidate that was able to participate. If a candidate is identified, this analysis can be amended with the additional case study.

APPENDIX VI – PERFORMANCE STANDARD CALCULATION INPUTS

Input Used to Produce Targets with the CNCA EBPS Tool

Table 136 is a summary of median site EUI and estimated end use site EUI. Most building types used the County's benchmarking information, though some had little representation (e.g., Food service, Public order and safety, Service) and used CBECS data in the absence of local data. Multifamily building data was from Washington, DC (see *Estimating the Baseline for Groups with Insufficient Energy Information*. The CNCA EBPS tool adjusted heating and cooling end uses for the Montgomery County climate when splitting out end uses from the local energy data by energy type (fuel vs electricity).

Table 136. Site energy totals and end use breakdown for all typologies for Montgomery County. This information was used to calculate technical feasibility limits.

All units Site EUI [kBTU/SF] ***Source:*** *CNCA EBPS Tool* ***using 2019 MC Benchmarking Data***		**Occupancy type Median Site EUI**			**Estimate of Electricity End Use Site EUI**			**Estimate of Gas or Oil End Use Site EUI**			
Principal Building Activity	Energy Data Source	**Site EUI Median**	Total Elec	Total Gas + Oil	Elec Heat	Elec Cool	Elec Other	Gas Heat	Gas WH	Gas Cook	Gas Other
MF-New-Tall	DC	48	36	12	8	13	14	0	11	1	0
MF-Old-Tall	DC	64	22	42	0	7	15	17	22	3	0
MF-Short	DC	62	24	38	0	7	17	14	21	3	0
Higher Education	County	104	34	69	0	9	26	37	16	4	13
Food sales	County	202	130	72	0	5	125	29	5	37	0
Food service	CBECS	271	91	180	0	19	72	20	39	121	0
Health care Inpatient	County	305	117	188	0	33	84	69	54	26	39
Health care Outpatient	County	73	73	0	2.0	8	63	0	0	0	0
Lodging	County	87	49	38	0	9	40	8	24	0	6
Mercantile Enclosed and strip malls	County	111	64	47	0	9	55	12	13	15	7
Mercantile Retail (other than mall)	County	62	46	16	0	8	39	10	2	5	0
Office	County	63	62	0	1.8	10	51	0	0	0	0.31
Other	County	235	180	56	0	29	151	51	4	0	0
Public assembly	County	96	49	48	0	20	28	29	3	9	7
Public order and safety	CBECS	86	45	40	0	12	33	15	21	4	0
Religious worship	County	57	34	24	0	8	26	17	0	6	0
Service	CBECS	62	26	36	0	5	21	21	15	0	0
Warehouse and storage	County	19	19	0	0.5	3	15	0	0	0	0
Vacant	County	25	15	10	0	2	12	9	1	0	0
Education K-12	County	55	30	25	0	8	23	13	6	1	5

APPENDIX VII - UNDERLYING ASSUMPTIONS FOR TARGET SETTING

The framework for site EUI target-setting comes from the CNCA toolset referenced earlier in this report. That report provides detail on how each energy end use is addressed to create the whole building targets, both for the Energy Efficiency target and the Zero Net Carbon-Compatible target. This summarizes the approach to target setting, but it does not dictate a specific retrofit package for a particular building. Any individual building would develop a scope of work that reflects how it would achieve or exceed its respective target. The target setting methodology, however, approximates what the typical building of a given occupancy type can achieve using assumptions on existing systems and their efficiency, both current and what is technically achievable.

Excerpt from CNCA report describing efficiency and electrification target underlying assumptions

This section describes interim steps that can be taken to gas-using end uses to reduce energy use without electrification. These standards are useful to inform what the performance standards can be set to in an interim time step that does not require electrification of gas-using equipment. The resulting energy efficiency performance targets will not be enough to achieve a zero-net carbon target since gas and on-site combustion are implicitly allowed.

***Space heating:** The default performance target for space heating would be that of a central gas-fired plant without distribution inefficiencies. Space heating distribution inefficiencies include overheating due to poor control and central plant efficiency derating due to poor operations. Space heating energy efficiency targets were developed using a combination of benchmarking data to compare gas use in similar building types across the core cities and the target analyses done in New York City[63] and Seattle[64]. While the previous studies did not cover all building types, the space heating in multifamily and commercial office spaces was analyzed. The typical commercial office building was estimated to be able to save approximately 30% on space heating. That same percentage savings is carried across to the CBECS building types to develop the energy efficiency targets.*

Interim energy efficiency target methodology: space heating EUI is reduced by 30% for each typology.

***Water heating:** for buildings where central water heating plants are typically present, an energy efficiency target is developed that assumes minimal distribution losses and water-conserving fixtures. For spaces that typically use more discrete water heating appliances, distribution losses are assumed negligible and the use of water-conserving fixtures is assumed. Water heater annual efficiency is assumed to be 80%.*

Interim energy efficiency target methodology: in spaces where central plants are assumed dominant, water heating energy efficiency targets are an allowance for each space based on floor area and space type. In spaces where water heating is mostly done at point of use, the energy efficiency target is the same as the baseline usage. This results in a water heating EUI performance standard.

***Cooking:** these are point of use appliances, and energy efficiency targets for cooking equipment are not different than the space's existing use. While there are often opportunities to conserve cooking gas energy, those energy efficiency improvements are not assumed in this technical analysis.*

Interim energy efficiency target methodology: energy efficiency target is same as the baseline usage for any given space type.

***Laundry Dryers:** these are typically appliances which burn gas at the point of use, and the efficiency for a given laundry demand can't be reduced without changing the appliance. As with cooking energy, conservation of laundry energy by changing operations for existing equipment is not assumed in this technical analysis. Energy efficiency targets for laundry equipment are not different than the space's existing use.*

Interim energy efficiency target methodology: energy efficiency target is same as the baseline usage for any given space type.

***Other Gas Process Loads:** there are end uses which do not fall neatly into the above end use categories. According to CEUS data, the "Miscellaneous" and "Process" loads make up 1.8% and 5.9% of commercial building gas use in California. The CBECS 2012 data indicate that "Other" gas loads, including laundry, make*

[63] One City Built to Last: Transforming New York City Buildings for a Low-Carbon Future, Technical Working Group Report. April 2016. https://www1.nyc.gov/html/gbee/downloads/pdf/TWGreport_2ndEdition_sm.pdf

[64] Building Energy Use Intensity Targets Final Report, prepared by Ecotope for the City of Seattle, Office of Sustainability and Environment. March 30, 2017. http://www.seattle.gov/Documents/Departments/OSE/BldgEngy_Targets_2017-03-30_FINAL.pdf

up 4% of gas use nationwide[65]. This category is made up of many types of end uses, such as cleaning, lab equipment, etc. The energy efficiency potential of such a grouping is not possible without detailed end use information that will not be available for every building in a given city unless audits are done on each building. As such, the energy efficiency target for other process loads will be assumed the same as the existing loads.

***Electricity Loads:** Electricity use reduction potential has been estimated at 30% across most building types, based on NYC Technical Working Group modeling using the following measures:*

- *Reduce Lighting Power Density (LPD) using lower wattage lamps and ballast changes*
- *Replace appliances with ENERGY STAR rated equivalents*
- *Occupancy sensors included to reduce the operating hours for lighting when spaces are not occupied*
- *Daylight sensors for all perimeter spaces*
- *Plug load management: vampire load reduction, master switching, smart plugs*
- *Replace old elevators*

The savings from these end loads are assumed true across cities, as these improvements are not climate dependent and reflect improvements that can be made by the commercial building industry as a whole.

Note that the assumptions around required electricity energy efficiency improvements are contingent on overall capacity constraints and the relative cost of new transmission, distribution, and generation. The above measures are technically feasible and can be promoted and implemented as needed to alleviate capacity constraints at the building, community, and city levels.

Achievable Energy Use Performance Through Electrification of Gas End Uses

The energy efficiency targets are then fed in by end use type to an electrification target analysis. The analysis assumes a change in appliance efficiency when transitioning from a combustion-based system to an electricity-based system. The efficiency change is developed by end use by comparing efficient gas appliances to efficient electric appliances for each end use type.

The location-specific and time-of-use cost of electricity compared to gas, combined with different operational characteristics and control may drive lower energy use, resulting in in additional energy use savings that are not broadly achievable through optimization of existing gas equipment alone. Those additional energy use savings are not added to these electrification targets but may make the overall performance targets easier to achieve when undertaking electrification.

For many buildings and space types, electrification will be a reset of the building system operations and therefore creates the opportunity to minimize waste through improved design, controls, and operations.

***Space heating:** gas appliances are assumed to deliver steam / hot water / hot air with an overall efficiency of ~80%. Electric heat pumps are assumed to deliver heating energy with an efficiency of ~250%.*

***Water heating:** gas appliances are assumed to deliver hot water at the current ENERGY STAR rated[66] thermal efficiency for gas equipment of 90%. Electric heat pump water heaters are assumed to deliver hot water at the current ENERGY STAR water heater rated efficiency of 220%.*

***Cooking:** gas appliances are assumed to deliver cooking energy at the current ENERGY STAR rated efficiency for gas equipment of 46%. Electric appliances are assumed to deliver cooking energy at the current ENERGY STAR rated efficiency for electric equipment of 74%. Because there are multiple types of cooking*

[65] 2012 CBECS Table E7. https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/e7.php
[66] https://www.energystar.gov/products/water_heaters/residential_water_heaters_key_product_criteria

equipment with varying efficiency ratings[67], a past study[68] was referenced for typical runtimes of equipment in restaurants to create a weighted average efficiency.

Laundry and Dryers: *gas appliances are assumed to operate at the current ENERGY STAR rated efficiency for gas equipment ~91% of electric appliances[69]. Electric appliances are assumed to operate at the current ENERGY STAR rated efficiency of 100%.*

Other Gas Process Loads: *a conservative assumption for the electrification of these process loads is that it would only be technically feasible to convert them to electricity with minimal efficiency gains. Assuming the conversion efficiency is similar to laundry dryers, the electric energy used will be 91% of the existing gas use for process loads. This conversion ratio is technically feasible even for process loads that require high temperatures such as steam cleaning since it is roughly the difference between high efficiency gas combustion and electric resistance.*

[67] Cooking Equipment Efficiency Ratings:

ENERGY STAR Requirements Comparison	Gas Efficiency [%]	Electric Efficiency [%]
ENERGY STAR - Ovens	46%	71%
ENERGY STAR - Fryers	50%	80%
ENERGY STAR - Griddles	38%	70%

[68] Livchak, D. "Energy Reduction in Commercial Kitchens". San Francisco Institute of Architecture. 2017. Table 10: https://fishnick.com/publications/fieldstudies/Energy_Reduction_in_Commercial_Kitchens_SFIA.pdf

[69] Dryers are not rated in terms of thermal efficiency but Clean Energy Factor. Gas units have a requirement of 3.48 CEF while electric units have a requirement of 3.93 CEF, a ratio of 91%.

The summary graphic in Figure 54 shows how the baseline, EE Target, and ZNC compatible target parameters are used to generate the technically achievable energy performance numbers for each typology using the approximations for each end use from whole-fuel data in the baseline.

How Targets are Calculated

All units **Site EUI** [kBTU/SF]

Electricity Use | "Gas" (Gas, Oil, District Steam) Use

Baseline assumes gas heating and gas hot water

Due to rounding, components may not add up to 100% of total

Baseline	BM Count	Total Site – All Fuels	Total Site Electricity	Total Site Gas	Space Cooling Elec	Other Elec	Space Heating	Water Heating	Cooking	Other
Food service	12	138	61	77	5	56	12	16	49	0
Health care Inpatient	5	201	81	120	8	73	55	29	14	21

Energy Efficiency **(EE) Target** EUI as a Percent of Baseline	70%		70%	100%

Zero Net Carbon **(ZNC) Target** EUI as a Percent of Baseline Converts gas EUI to electricity EUI	100%		Space heating	Water heating	Cooking	Other
			32%	**41%**	**61%**	**89%**

(sum of products)

	Baseline			**EE Target**			**ZNC Target**		
	Total Site Gas	Total Site Electricity	Total Site – All Fuels	Total Site Gas	Total Site Electricity	Total Site – All Fuels	Total Site Gas	Total Site Electricity	Total Site – All Fuels
Food service	77	61	**138**	74	49	**122**	0	88	**88**
Health care Inpatient	120	81	**201**	104	65	**169**	0	117	**117**

Figure 54. Summary of target calculation methodology with default Energy Efficiency reductions shown.

The ZNC Target calculation builds off the EE Target as a new baseline and converts all fuel-burning end uses to electricity using a ratio for that end use. For example, the food service building (i.e., a restaurant of sorts) has a cooking EUI at the baseline up at the top in gray of 49 site kBTU/SF. This energy use doesn't change for the interim target energy efficiency target under the assumption that some level of energy efficiency is already implemented. That 49 kBTU/SF is multiplied by 61%, converting it to about 30 kBTU/SF. This is done under the assumption that all-electric cooking appliances use 61% of the site energy as their equivalent gas counterparts, assuming the same amount of food is cooked in the same ways. That conversion ratio was developed for all gas end uses and is applied to the baseline in the same way, resulting in a new EUI.

APPENDIX VIII - SENSITIVITY TESTS ON MODEL IMPACT RESULTS

Long-term projections are the result of a number of assumptions including estimates of capital costs, operating costs, and compliance rates. In acknowledgement of the variability of the results, several input assumptions were modified to understand how dependent the outputs are to the various assumptions used for these projects.

For example, the cost of completing energy efficiency work in buildings can change with time. This can be caused by multiple factors including but not limited to new technology, new financing options, and supply chain improvements. Precise prediction of these trends was not completed for this technical analysis.

Instead, the analysis team varied the costs of compliance efficiency work in the policy model (not in the case study packages) to show how the countywide capital cost would change if measure costs changed to be as little as 10% of today's estimates (multiplier of 0.1), and up to 200% of today's estimates (multiplier of 2.0). Each end use was modified individually along efficiency and electrification measures.

Of the measure categories, space heating electrification had the greatest impact on total countywide costs, indicating that space heating electrification may be a major driver of the total capital costs needed for buildings to meet a BEPS in Montgomery County. If all other measure costs remained unchanged, but space heating electrification costs doubled from the estimate used in the technical analysis, then total countywide capital costs would increase 39% from the technical analysis estimate. At the other end of the spectrum, if space heating electrification costs were reduced to 10% of today's cost estimates, the total cost of compliance would be 65% of the technical analysis estimate. These results are highlighted in yellow in the total cost sensitivity results shown in Table 117. By comparison, the cost of space heating energy efficiency (improving existing gas-based systems where present) would drive total costs up or down by just 6% (represented as 94% to 106% of study estimate in table).

The next largest driver of total costs is electrical energy efficiency work in commercial buildings (bottom table section), which can drive a +/-15% variation in capital cost depending on measure cost changes over time.

These results helped the analysis team to focus efforts on costs of measures for the impact model and for the case study measure cost estimates.

Table 137. Sensitivity test results of total countywide capital costs of the BEPS to changes in energy efficiency measure costs.

Sensitivity of total capital cost to the cost of retrofit types				
Not incremental costs		Efficiency cost multiplier		
	Space Heating	0.1	1	2
Electrification cost multiplier	0.1	59%	65%	71%
	1	94%	100%	106%
	2	133%	139%	145%
		Efficiency cost multiplier		
	DHW	0.1	1	2
Electrification cost multiplier	0.1	86%	90%	93%
	1	97%	100%	104%
	2	108%	112%	115%
		Efficiency cost multiplier		
	Cooking	0.1	1	2
Electrification cost multiplier	0.1	88%	92%	95%
	1	97%	100%	103%
	2	106%	109%	113%
		Efficiency cost multiplier		
	Process/Other	0.1	1	2
Electrification cost multiplier	0.1	96%	97%	98%
	1	99%	100%	101%
	2	103%	104%	105%
		Commercial cost multiplier		
	Elec Efficiency	0.1	1	2
Resi. cost multiplier	0.1	81%	95%	112%
	1	85%	100%	116%
	2	91%	105%	122%

APPENDIX IX - SUMMARY OF DATA SOURCES

The first task undertaken by the analysis team was to summarize the data needs to complete the analysis, both for creating performance standards and for completing the cost and benefit analysis of the created performance standards. The analysis team compiled relevant data sources to complete these tasks. This appendix section summarizes those data sources and their respective uses.

Data Sources Building Type Groupings

The team used SDAT tax data to quantify building counts, building age, occupancy use type, and gross floor area for countywide analyses. The Montgomery County benchmarking data was used to inform baseline energy usage for all groupings with significant representation, initially defined as ten building submissions.

Table 138. Data Sources used to inform building stock and groupings, focusing on the anticipated covered building types.

	MC DEP Supplied			Publicly Available		
Data Sources for Building Groupings	**SDAT & GIS**	**CoStar Export**	**County Benchmarking (2019)**	**DC Benchmarking (2019)**	**Census ACS2019**	**CBECS[70] + RECS[71]**
Has MC Specific data?	Yes	Yes	Yes	No	Yes	No
Size Threshold	25k SF+	25k SF+	50k SF+	50k SF+	5+ units	5+ Units
MF Buildings	Yes (parcel only)	Yes	**No**	**Yes**	Yes	Yes
Com. Buildings	Yes	Yes	Yes	Yes	No	Yes
Gov't Bldgs	Yes	Yes	Yes	Yes	No	Yes
Exempt Use Types	Yes	Yes	No	No	No	Yes
Energy Use Data	No	No	**Yes**	**Yes**	No	Yes
MBID Parcel ID	Yes	Yes	Yes	N/A	No	No
Granularity of Submissions	Parcel and buildings	Buildings	Mostly by parcel	No	Apt Units	Building Types

[70] Commercial Building Energy Consumption Survey (CBECS). 2012 data used. https://www.eia.gov/consumption/commercial/data/2012/

[71] Residential Energy Consumption Survey (RECS). 2015 data used. https://www.eia.gov/consumption/residential/data/2015/

Benchmarking Data from Montgomery County

Focusing on the benchmarking data from 2019, which was analyzed to identify gaps in building sample sizes and persistent data quality issues. Note: this does not filter for the anticipated covered buildings list respective to use type or ownership exemptions.

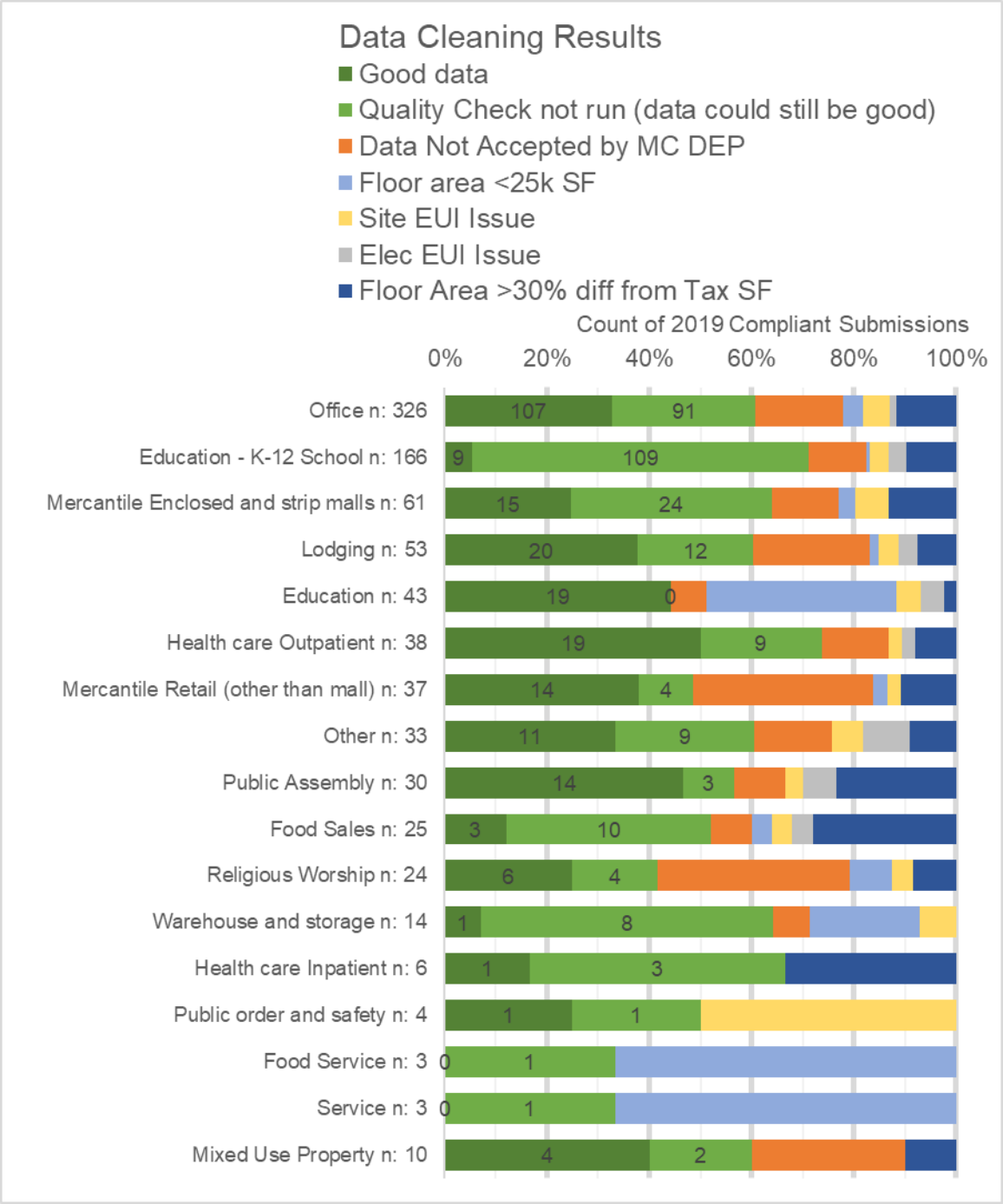

Figure 55. The relative number of properties per building grouping in each data quality result field. Montgomery County benchmarking data 2019. The chart is scaled to 100% of each groups submissions. See next chart for absolute counts.

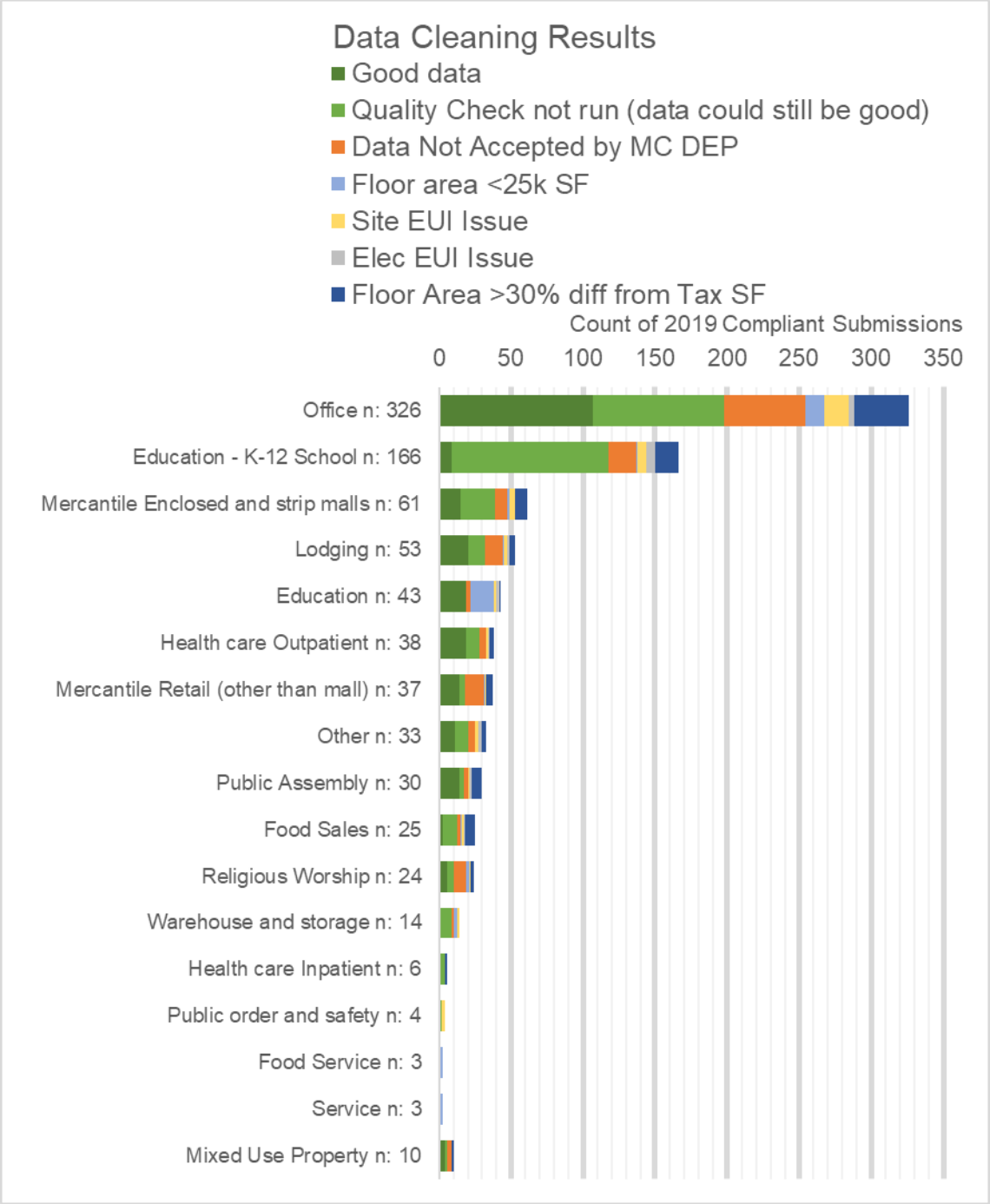

Figure 56. The absolute number of properties per building grouping in each data quality result field. Montgomery County benchmarking data 2019.

Explanation of Cleaning Flags

- Good data: no issues identified, and the PM Data Quality Checker[72] was run and didn't find any issues.
- Quality Check not run: the PM Quality Checker was not run for the building by the benchmarking provider or building owner, for whatever reason, so some flags (such as less than 12 months of data) could not be

[72] The ENERGY STAR Portfolio Manager Data Quality Checker flags if there are gaps or overlaps in energy data, or if energy data uses estimate data from PM defaults. It is a good tool for checking for complete data in the benchmarking submission, but there isn't a test for appropriate data beyond submission completeness.

identified. Many of these buildings are good data since the benchmarking submission does not require running the quality checker tool.

- Data Not Accepted by MC DEP: MC DEP determined any buildings with data flags in the PM Data Quality Checker, or a building was not in compliance with the data verification requirement due in 2019, and contacted the building owners to make corrections and resubmit reports
- Floor Area <25k SF: building is smaller than the proposed BEPS policy would cover
- Site EUI Issue: the site EUI was outside a mean +/- 2 standard deviation range for the CBECS occupancy type using a log-normal transformation
- Elec EUI Issue: the electricity EUI was outside a mean +/- 2 standard deviation range for the CBECS occupancy type using a lognormal transformation
- Floor Area >30% different from Tax SF: the reported gross floor area (not including parking) was more than 30% different than the SDAT gross building floor area. This flag looked prominent in building types that may have indoor parking affecting the tax data floor area.

Secondary Multifamily Data Sources

There were several potential data sources for multifamily buildings beyond SDAT and benchmarking data that were referenced as necessary to supplement the information needed to complete the analysis.

CoStar

Multifamily buildings in Montgomery County were also reviewed using CoStar data, which gave some detail on ownership type and quantity of multifamily buildings in the county.

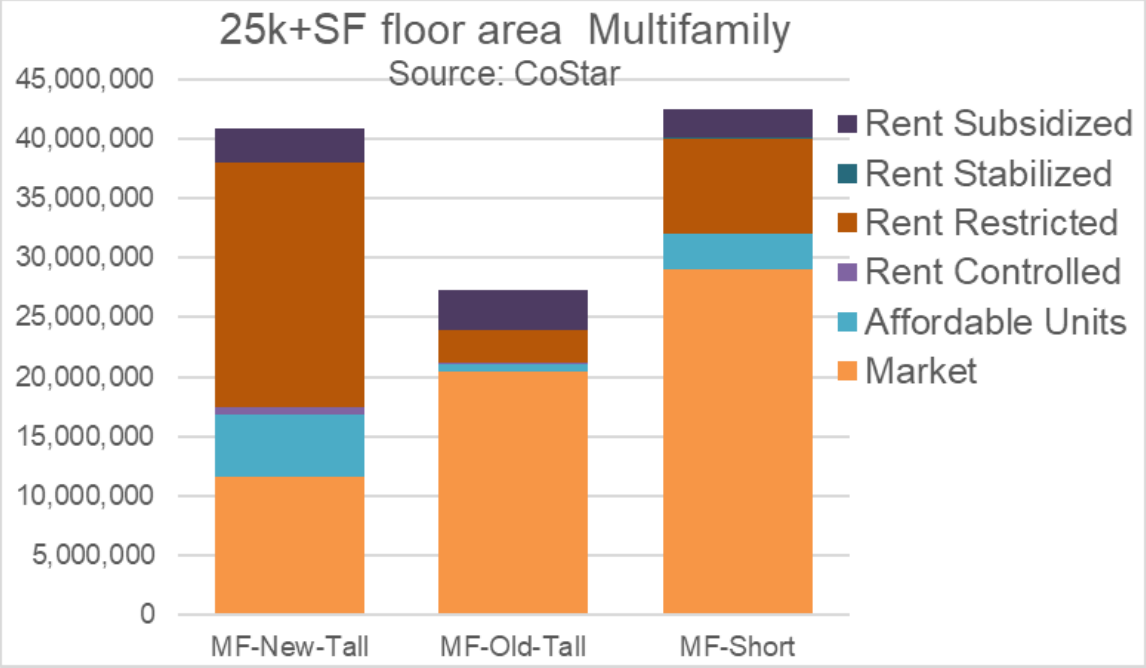

Figure 57. CoStar Multifamily buildings in Montgomery County. See definitions below.

CoStar Definitions of Rent Types (Multifamily)[73]

- Market Rent: Rents that are set by the owner/operator and are independent of any regulatory conditions or restrictions.
- Affordable: **All** of the community's rents are discounted or below market. Affordable properties must be further categorized with an Affordable Subtype.

[73] CoStar Glossary. https://www.costar.com/about/costar-glossary. Accessed 1/31/2021

- Market/Affordable: A **portion** of the community's rents are discounted or below market. Once the project is flagged as Affordable or Market Affordable, it is categorized into the following rental subtypes:
    - Rent Restricted: Properties classified as Rent Restricted most commonly have rental rates based on Area Median Income (AMI). These properties typically receive tax-advantaged equity and/or debt financing, including Low-Income Housing Tax Credits (**LIHTC**). Low-income renters at these communities typically have an annual household income that is less than 80% of AMI but greater than 30% of AMI. This is the most common type of Affordable Subtype classification.
    - Rent Subsidized: Rents are subsidized by the Department of Housing and Urban Development (HUD) **Section 8** or other federal programs. Low-income renters at these properties typically earn less than what is needed to qualify for Rent Restricted housing and pay rent and other housing costs at a rate equal to a specific percentage of their annual household income.
    - Other classifications in Montgomery County are likely data entry errors as those programs may not be available in MC.

Census ACS

Data from the Federal Census' American Community Survey (ACS)[74] was referenced for estimates of housing structure in Montgomery County. This was compared to Montgomery County tax data (SDAT) for large multifamily property statistics.

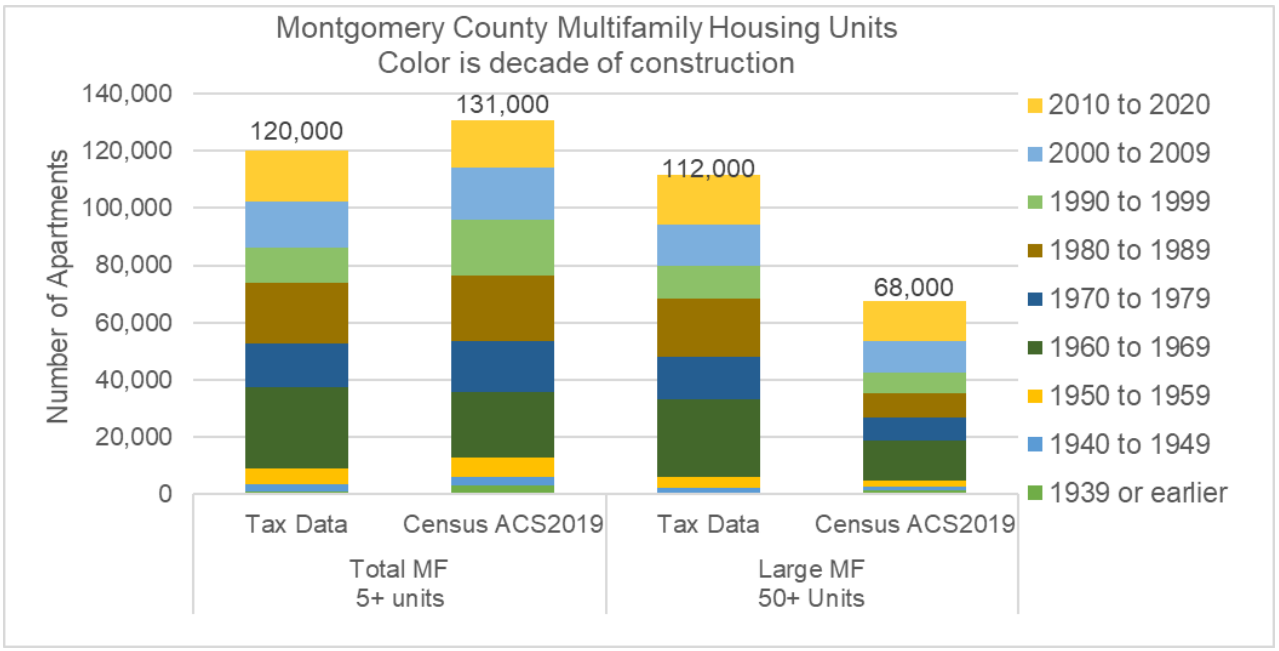

Figure 58. A comparison of multifamily building information between Census and County data sources.

This data showed a discrepancy in the Census data for the total number of large multifamily. This discrepancy could be due to the way buildings are sampled, with tax assessments consolidating multiple buildings on a tax lot, while census surveys consider the size of the single physical building. This could cause the discrepancy, particularly in garden-style apartments (MF-Short). The analysis used the tax data as it was likely more representative of how owners will interact with the proposed BEPS policy. Based on this review, the technical analysis used the SDAT tax data since the ACS data appeared to show an inaccurate picture of large multifamily units in the county.

[74] Survey/Program: American Community Survey, 2019 Microdata, query: https://data.census.gov/mdat/#/search?ds=ACSPUMS1Y2019&cv=BLD&rv=YBL,ucgid&wt=WGTP&g=7950000US2401001,2401002,2401003,2401004,2401005,2401006,2401007

Data Sources for Structuring Interim and Final Performance Standards for Covered Buildings

- The Montgomery County Stakeholder Recommendation Report[75] has a number of recommendations on the type of metric to use and how to compile the needed information.
- Carbon Neutral Cities Alliance's "Performance Standards for Existing Buildings: Performance Targets and Metrics Final Report"[76] is a methodology and workbook[77] that was used to inform interim and final performance standards across buildings types. This framework has been used by Seattle, WA, and Los Angeles, CA, to provide insight to stakeholders on the potential performance of buildings undergoing deep retrofits over the next 20-30 years. SWA was the author of this work with participation by expert advisors and city staff around the country.[78] Montgomery County was an observer to the project.
- SWA referenced existing studies on projected cost and benefit trends – technology, energy cost, workforce development.
- Projecting Business-as-Usual (BAU) energy use change over time
    - Year-on-year changes in electricity use for commercial and residential buildings: AEO2020 Buildings report projects an electricity intensity change of -0.2% EUI per year through 2050, due to a balance of increased electronics and IT tempered by improving lighting and appliance efficiency.[79] This results in a total electric EUI decrease of 3% from 2020 by 2035. However, the observed error of these projections is generally larger[80] than the projected growth over a 15-year forecasting period, at 10-13%.[81,82] The analysis team used a constant energy use assumption to simplify the findings.

Data Sources for Impacts of Performance Standards on County Goals

- Projected power supply changes over time toward a renewable-based grid. In lieu of a detailed plan, the team used the grid coefficient today and drew a straight line to zero for the projected date when the electricity supply would be 100% emissions free.
- Energy emissions intensities from the Montgomery County Calendar Year 2018 GHG Inventory[83] were used for the primary energy types[84] of electricity and natural gas.
- These numbers roughly agree with the EPA Portfolio Manager coefficients for the county today, though the GHG inventory incorporates some amount of fugitive natural gas leakage, while the EPA emissions intensity assumes zero gas leakage.

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[75] https://www.montgomerycountymd.gov/DEP/Resources/Files/ReportsandPublications/Energy/MC-BEPS-Stakeholder-Report.pdf
[76] http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Targets-and-Metrics-Memo-Final-March2020.pdf
[77] http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Targets-Workbook-Final.xlsx
[78] Slide 4. http://carbonneutralcities.org/wp-content/uploads/2020/03/CNCA-Existing-Building-Perf-Standards-Project-Summary-Final.pdf
[79] EIA, 2020. "Annual Energy Outlook: Buildings". Slides 11 and 12. https://www.eia.gov/outlooks/aeo/pdf/AEO2020%20Buildings.pdf
[80] EIA, 2020. "Annual Energy Outlook Retrospective Review". Tables 18 and 19. https://www.eia.gov/outlooks/aeo/retrospective/
[81] EIA, 2020. "Annual Energy Outlook Retrospective Review". Table 2. https://www.eia.gov/outlooks/aeo/retrospective/
[82] Sakva, D. "Evaluation of errors in national energy forecasts." (2005) Thesis. Rochester Institute of Technology. https://scholarworks.rit.edu/cgi/viewcontent.cgi?article=8181&context=theses&httpsredir=1&referer=
[83] Montgomery County Community Wide Greenhouse Gas Emissions Inventory. https://www.montgomerycountymd.gov/green/climate/ghg-inventory.html accessed 2/1/2021
[84] Calculated from GHG Inventory Data – July 2020.xlsx https://www.montgomerycountymd.gov/green/Resources/Files/climate/ghg-inventory-data-summary-july-2020.xlsx

Data Sources Costs and Benefits of Performance Standards

Electricity and Natural Gas Rates

The team referenced Pepco and Washington Gas proposed rates.[85] Montgomery County has a specific Fuel Energy Tax[86,87] which adds to ratepayer energy costs. The supply charges ("Purchased Gas Charge") for Washington Gas are difficult to calculate from the text in their tariff structure, but this appears to have final costs for different rates, but only for Jan-Feb 2021: https://www.washingtongas.com/-/media/ee15bdb7a3f4424bbd799202b0d88496.pdf

This is a listing with the Maryland Public Service Commission (MD PSC) for the past three years for multiple MD gas utilities: https://www.psc.state.md.us/gas/wp-content/uploads/sites/4/Gas-Fact-Sheet-January-2021.pdf

Statewide electric and natural gas rates, used for range checking to make sure calculated rates are reasonably close to energy rates that a Montgomery County building owner may have:

Table 139. Statewide electricity rates[88].

Electricity Customer Type	Cents/kWh	$/MMBTU
Residential	13.12	38.5
Commercial	9.97	29.2
Industrial	7.80	22.9
Other	NA	NA
Transportation	7.37	21.6
Total	11.24	32.9

Statewide Electricity $/MMBTU	Winter	Non-winter
Residential	$39	$38
Commercial	$29	$28

Rates Used for this Analysis

This analysis used a single blended rate for all building types. Metering configurations and the diversity of supply and delivery charges made the above averages less meaningful. Non-residential buildings pay different rates based on complex energy supply contracts. Many residential buildings use a combination of commercial and residential rates to serve different areas of the building.

Table 140. Energy rates used in this analysis across commercial and residential buildings.

Energy Type	Base Rate	+MC Fuel Energy Tax (FET)	Total blended rate
Gas ($/therm)	$ 1.049	$ 0.17026	$ 1.2280
Electricity ($/kWh)	$ 0.126	$ 0.01978	$ 0.1229

[85] Current Washington Gas Rates: https://www.washingtongas.com/my-account/account-services-support/current-rates/maryland-tariff-info
Potential Washington Gas Rates (pending PSC approval): https://www.washingtongas.com/-/media/f6111a418b694d619e5486776fec58a3.pdf
Current Pepco Rates: https://www.pepco.com/MyAccount/MyBillUsage/Pages/MD/CurrentTariffsMD.aspx
[86] Washington Gas: https://www.washingtongas.com/media-center/montgomery-county-fuel-energy-tax
Pepco: https://www.pepco.com/MyAccount/MyBillUsage/Documents/Pepco%20MD%20Other%20Surcharges%20-%20012021.pdf
[87] https://www.montgomerycountymd.gov/Finance/Resources/Files/FY2021Utility%20Return.pdf
[88] Source: https://www.eia.gov/electricity/state/maryland/ . Accessed January 2021.

Cost and Expected Savings for Retrofits

- Maryland/Mid Atlantic Technical Reference Manual, Version 10[89]
- Washington DC actual project cost information: collected by SWA for the DOEE Cost and Benefits Grant from building owners and industry consultants. Note: this resource may be subject to some data sharing limitations.
- Washington DC Building Electrification Institute (BEI) project estimates: collected by SWA and BEI as part of work for DC DOEE analyzing the economics of multifamily electrification retrofits
- Washington DC RS Means cost & labor lookup: collected by SWA to supplement cost estimates for industry standard work where actual cost data are not available
- New York City Technical Working Group report cost estimates
- New York City actual project cost information: SWA audit and energy consulting experience
- Washington Gas and Pepco energy efficiency program cost database, which may be acquired with MC DEP help through the utilities' consultants.
- Survey respondents from Montgomery County Building Survey to be distributed as part of this project

[89] Shelter Analytics and Northeast Energy Efficiency Partnerships. March 2020. https://neep.org/sites/default/files/resources/Maryland-MidAtlantic%20TRMv10.pdf

APPENDIX X – LITERATURE REVIEW OF DEEP RETROFIT SAVINGS

Energy Efficiency Retrofit Savings

The Montgomery County climate falls between the "Marine" and "Cold" climates in the Advanced Energy Retrofit Guide (AERG) studies.

DOE Advanced Energy Retrofit Guide – Offices[90]

The savings beyond the modeled existing building retro-commissioning (EBCx) are modeled as 14-16% using cost-effective measures from a list of possible options. In the AERG analysis, the post-EBCx site EUI is similar to the Montgomery County median site EUI for Offices, and the standard retrofit brings that EUI to the EE standard of ~53kBTU/SF.

	Site Energy Use Intensity (EUI) (kBtu/sf)		Site EUI Reduction		
	Baseline	Post-Standard Retrofit	Post-EBCx	Post-Standard Retrofit	Reduction Beyond EBCx
Hot & Humid	88	**59**	15%	**33%**	18%
Hot & Dry	97	**58**	22%	**40%**	18%
Marine	94	**54**	27%	**43%**	16%
Cold	86	**53**	24%	**38%**	14%
Very Cold	91	**57**	25%	**38%**	13%
Average	91	**56**	23%	**38%**	15%

Figure 59. Extracted Table 4.2 from the Office AERG, showing cost effective savings of 14-16% EUI reduction for a typical building that has already completed retro-commissioning.

Common measures used in the AERG analysis are shown in Table 4.3 of the document. Other measures would be more applicable for certain building and equipment types. The document has a more extensive list of possible retrofits in Table 4.1.

System	Measure Description	Climate Zones	Appendix Page # Ref.
Lighting	L6. Install occupancy sensors to control interior lighting	All	140
Lighting	L7. Add daylight harvesting	All	142
Lighting	L8. Retrofit exterior fixtures to reduce lighting power density, and add exterior lighting control	All	143
HVAC - Air Side	HA11. Widen zone temperature deadband (replace pneumatic thermostats)	All	160
HVAC - Air Side	HA12. Lower VAV box minimum flow setpoints (rebalance pneumatic boxes)	All	161

Figure 60. Table 4.3 from the AERG-Offices[91].

[90] Pacific Northwest National Lab (PNNL) and PECI. September 2011. "Advanced Energy Retrofit Guides: Office Buildings". https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf

[91] Supra 90, page 62.

DOE Advanced Energy Retrofit Guide – Retail[92]

The savings beyond the modeled existing building retro-commissioning (EBCx) are modeled as 21-22% using cost-effective measures from a list of possible options. In the AERG analysis, the post-EBCx site EUI (78-85 kBTU/SF) is higher than the Montgomery County median site EUI for Retail (other than mall) at 63 kBTU/SF. This could be due to advances in lighting technology and the proliferation of fluorescent and LED lighting in retail spaces. If so, some HVAC optimization measures recommended by the AERG analysis may be more applicable, which are a blend of EBCx and standard retrofit options.

	Site Energy Use Intensity (EUI) Savings (kBtu/sf/yr)			Site EUI Reduction	
	Baseline	**Post-Standard Retrofit**	Post-EBCx	**Post-Standard Retrofit**	Reduction beyond EBCx
Hot & Humid	107	**73**	13%	**32%**	18%
Hot & Dry	103	**69**	15%	**33%**	18%
Marine	90	**58**	14%	**36%**	22%
Cold	100	**64**	15%	**36%**	21%
Very Cold	102	**63**	16%	**38%**	22%
Average	100	**66**	15%	**35%**	20%

Figure 61. Extracted Table 4.2 from the Retail AERG, showing cost effective savings of 21-22% EUI reduction for a typical building that has already completed retro-commissioning.

A concise list of commonly applicable measures is shown in Table 4-3, which is reprinted from the DOE Advanced Energy Retrofit Guide and so follows the naming conventions in that document:

Table 4.3. Standard Retrofit Recommended Package Measures

System	Measure Description	Climate Zone	Appendix Page # Ref.
Lighting	L3. Add daylight harvesting	All	134
Lighting	L4. Re circuit and schedule lighting system by end use	All	135
Lighting	L5. Retrofit interior fixtures to reduce lighting power density by 13%	All	136
Lighting	L9. Retrofit exterior fixtures to reduce lighting power density, and add exterior lighting control	All	141
HVAC	H18. Remove heat from front entry	Marine, Cold, Very Cold	159

A more comprehensive list of options is shown in Table 4-1 of the DOE Advanced Energy Retrofit Guide.

[92] Pacific Northwest National Lab (PNNL) and PECI. September 2011. "Advanced Energy Retrofit Guides: Retail Buildings". https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20814.pdf

DOE Advanced Energy Retrofit Guide – Food Sales[93]

Supermarkets in this analysis have a post-EBCx site EUI of 198-226 for the nearest climates, which is close to the MC median site EUI of 200 kBTU/SF. After the recommended measures are implemented, site EUI in the AERG analysis drops to 155-176, a savings of 22%. The EE standard for Montgomery County is 172 kBTU/SF.

Location	EUI (kBtu/ft²)*		
	Baseline	Post-EBCx	% Reduction From Baseline
Miami (Hot & Humid)	203	184	9%
Las Vegas (Hot & Dry)	219	189	14%
Seattle (Marine)	238	198	17%
Chicago (Cold)	265	226	15%
Duluth (Very Cold)	301	254	15%
Average	245	210	14%

*Annual cost and energy savings are first year values. Cost savings are expressed in 2011 dollars.

Location	EUI (kBtu/ft²)		
	Baseline	Post-Retrofit	Percent Reduction
Miami (Hot & Humid)	203	160	21.0%
Las Vegas (Hot & Dry)	219	168	23.3%
Seattle (Marine)	238	155	34.5%
Chicago (Cold)	265	176	33.5%
Duluth (Very Cold)	301	200	33.3%
Average	245	172	29.1%

*Energy savings for retrofit packages do not include the effects of EBCx.

Figure 62. Extracted Tables 3-2 and 4-3 from Grocery Store AERG, showing 15-17% savings from retro-commissioning and an additional 17-18% from retrofits.

The applicable measures used in the retrofit are in the Table 4-4 shown below.

Table 4–4 Measures Included in the Recommended Retrofit Packages

System	Measure Description	Climate Zone	Section
Lighting	Replace T-12 fluorescent lamps and magnetic ballasts with high-efficiency T-8 lamps and instant-start electronic ballasts	Hot & humid	F.1.1
Lighting	Replace incandescent ambient lighting with CFL and accent/display lighting with metal halide	All	F.1.2
Lighting	Replace refrigerated display case lighting with LEDs	All	F.1.3
Lighting	Install photosensors and dimming ballasts to dim lights when daylighting is sufficient	Hot & humid, hot & dry	F.1.6
Refrigeration	Install high efficiency EC evaporator fan motors	All	F.2.1
Refrigeration	Install doors on open refrigerated cases	Marine, cold, very cold	F.2.3
Refrigeration	Install controls to disable anti-sweat heaters when dew point is low	Cold, very cold	F.2.4
Refrigeration	Install strip curtains and weather seal walk-in freezer doors	All	F.2.7
HVAC	Install variable speed drive kitchen hood exhaust fans with demand control ventilation	All	F.2.13
HVAC	Replace inefficient motors with right-sized NEMA premium efficiency	All	F.3.7
HVAC	Convert constant volume or dual duct air handling systems to variable air volume	All	F.3.8
HVAC	Upgrade to demand control ventilation to reduce outdoor airflow during partial occupancy	All	F.4.1

Figure 63. Extracted Table 4-4 from Grocery Store AERG, showing applicable measures for groceries stores that could be sufficient for meeting an energy efficiency target.

[93] National Renewable Energy Lab (NREL), et al. July 2013. “Advanced Energy Retrofit Guides- Grocery Stores”. https://www.nrel.gov/docs/fy13osti/54243.pdf

DOE Advanced Energy Retrofit Guide – Health Care Inpatient[94]

Montgomery County's hospitals have a higher EUI than this analysis' models, at 305 kBTU/SF compared to the AERG analysis' 263 kBTU/SF. Assuming an intervention including both EBCx and standard retrofit scopes, the resulting EUI is in the 200-240 range. In this building type, the AERG analysis found that more savings were available through EBCx, so those measures are shown, extracted from Table 3-3 in the report.

Location	EUI (kBtu/ft²)*		
	Baseline	Post-EBCx	% Reduction From Baseline
Miami (Hot-Humid)	263	226	14%
Las Vegas (Hot-Dry)	268	214	20%
Seattle (Marine)	263	198	25%
Chicago (Cold)	263	205	22%
Duluth (Very Cold)	249	192	23%
Average	261	207	21%

* Annual cost and energy savings are first year values. Cost savings are expressed in 2011 doll

Location	EUI (kBtu/ft²)		
	Baseline	Post- Retrofit	Percent Reduction
Miami (Hot-Humid)	263	257	2.1%
Las Vegas (Hot-Dry)	268	262	2.2%
Seattle (Marine)	263	240	8.6%
Chicago (Cold)	263	253	3.6%
Duluth (Very Cold)	249	204	18.1%
Average	261	243	6.9%

* Energy savings for retrofit packages do not include the effects of EBCx.

Figure 64. Extracted Tables 3-2 and 4-3 from Health care Facility AERG, showing 22-25% savings from retro-commissioning (left) and an additional 3-8% from retrofits(right).

Table 3–3 EBCx Measures In Recommended Package

System	EEM Description	Climate Region	Section
Lighting	Calibrate lighting controls and optimize settings based on building usage patterns and daylight availability	All	E.1.1
Plug and process loads	Control computer power management settings facility wide through software or logon scripts, except for computers in critical applications in hospitals	All	E.2.2
HVAC	TAB AHUs, flow modulation devices, chilled water pumps and valves, and refrigerant lines to ensure that flow rates and supply air temperatures meet cooling loads and no unnecessary flow restrictions are present	All	E.5.1
	Verify correct operation of OA economizer if one is installed. In Miami and other hot-humid climates, it is important to confirm that the economizer is contributing to energy savings. In these climates, economizers can use more energy than they save, and maintenance costs can sometimes exceed energy cost savings.	All	E.5.6
	Turn off or set back HVAC equipment overnight in areas that are not being used (cafeterias, educational areas, office space) (hospitals only)	All	E.5.8
	Reoptimize supply air temperature reset based on current building loads and usage patterns	All	E.5.12
	Reoptimize boiler temperature reset based on current building loads and usage patterns	All	E.5.13
	Reduce ventilation levels in operating rooms, delivery rooms, laboratories, and other intermittently used spaces when unoccupied, while maintaining pressurization (hospital only)	All	E.6.2

Figure 65. Extracted Table 3-3 from Health care Facilities AERG, showing applicable measures for could contribute to meeting an energy efficiency target.

[94] National Renewable Energy Lab (NREL), et al. September 2013. "Advanced Energy Retrofit Guides- Healthcare Facilities". https://www.nrel.gov/docs/fy13osti/54243.pdf

APPENDIX XI – SPACE TYPE DEFINITION GUIDANCE FROM EPA PORTFOLIO MANAGER

The following is the current Portfolio Manager guidance for each impacted property type used in the cost-benefit case studies at the time of this report preparation.[95]

Multifamily Housing

Portfolio Manager guidance on multifamily square footage is as follows:

"Gross Floor Area (GFA) should include all buildings that are part of the multifamily property, including any separate management offices or other buildings that may not contain living units.

Gross Floor Area should include all fully-enclosed space within the outside surfaces of the exterior walls of the building(s) including living space in each unit (including occupied and unoccupied units), interior common areas (e.g. lobbies, offices, community rooms, restrooms, common kitchens, fitness rooms, indoor pools), hallways, stairwells, elevator shafts, connecting corridors between buildings, storage areas, and mechanical space such as a boiler room. Open air stairwells, breezeways, and other similar areas that are not fully-enclosed should not be included in the GFA."

For this technical analysis and determination of BEPS targets, commercial retail spaces are included toward the total square footage, but not as multifamily square footage. The square footage of the commercial spaces uses a different multiplier toward the BEPS target.

Office

Portfolio Manager guidance on office square footage is as follows:

"Office refers to buildings used to conduct commercial or governmental business activities. This includes administrative and professional offices. Gross Floor Area (GFA) should include all space within the building(s) including offices, conference rooms and auditoriums, break rooms, restrooms, kitchens, lobbies, fitness areas, basements, storage areas, stairways, and elevator shafts.
If you have restaurants, retail, or services (dry cleaners) within the Office, you should most likely include this square footage and energy in the Office Property Use.

There are 4 exceptions to this rule when you should create a separate Property Use:

- *If it is a Property Use Type that can get an ENERGY STAR Score (note: Retail can only get a score if it is greater than 5,000 square feet)*
- *If it accounts for more than 25% of the property's GFA*
- *If it is a vacant/unoccupied Office*
- *If the Hours of Operation differ by more than 10 hours from the main Property Use"*

Hotel (Lodging)

Portfolio Manager guidance on hotel square footage is as follows:

"Hotel refers to buildings renting overnight accommodations on a room/suite and nightly basis, and typically include a bath/shower and other facilities in guest rooms. Hotel properties typically have daily services available to guests including housekeeping/laundry and a front desk/concierge.

Hotel does not apply to properties where more than 50% of the floor area is occupied by fractional ownership units such as condominiums or vacation timeshares, or to private residences that are rented out on a daily or

[95] Energy Star Portfolio Manager Glossary. Accessed May 2021. https://portfoliomanager.energystar.gov/pm/glossary

weekly basis. Hotel properties should be majority-owned by a single entity and have rooms available on a nightly basis. Condominiums or Timeshares should select the Multifamily Housing property use.

Gross Floor Area should include all interior space within the building(s), including guestrooms, halls, lobbies, atriums, food preparation and restaurant space, conference and banquet space, fitness centers/spas, indoor pool areas, laundry facilities, elevator shafts, stairways, mechanical rooms, storage areas, employee break rooms, restrooms, and back-of-house offices."

Retail

Portfolio Manager guidance on Retail square footage is as follows:

"Retail Store refers to individual stores used to conduct the retail sale of non-food consumer goods such as Department Stores, Discount Stores, Drug Stores, Dollar Stores, Hardware Stores, and Apparel/Specialty Stores (e.g. books, clothing, office products, sporting goods, toys, home goods, and electronics). Buildings containing multiple stores should be classified as enclosed mall, lifestyle center, or strip mall.

Gross Floor Area should include all space within the building(s), including sales areas, storage areas, offices staff break rooms, elevators, and stairwells."

Worship Facility

Portfolio Manager guidance on Worship Faculties square footage is as follows:

"Worship Facility refers to buildings that are used as places of worship. This includes churches, temples, mosques, synagogues, meetinghouses, or any other buildings that primarily function as a place of religious worship.

Gross Floor Area should include all areas inside the building that includes the primary worship area, including food preparation, community rooms, classrooms, and supporting areas such as restrooms, storage areas, hallways, and elevator shafts.

The ENERGY STAR score for Worship Facilities applies to buildings that function as the primary place of worship and not to other buildings that may be associated with a religious organization, such as living quarters, schools, or buildings used primarily for other community activities. To receive an ENERGY STAR score, a Worship facility must have at least 25 seats, but cannot have more than 4,000."

Parking

Exterior, partially-enclosed, and enclosed parking is not included in the square footage calculations to determine the BEPS targets or EUI calculations.

APPENDIX XII – ACRONYMS

AHU:	air handling unit
ASHRAE:	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
AWHP:	air-to-water heat pump
BBTU:	Billion British thermal units
BEPS:	Building Energy Performance Standards
BMS:	building management system
BOMA:	Building Owners and Managers Association
CBECS:	Commercial Buildings Energy Consumption Survey
CDD:	cooling degree days
CFL:	compact fluorescent lamp
CNCA:	Carbon Neutral Cities Alliance
COP:	coefficient of performance
CT:	cooling tower
DDC:	direct digital control
DHW:	domestic hot water
DNE:	does not exist
DOAS:	dedicated outdoor air system
DX:	direct expansion
EEM:	energy efficiency measure
EIA:	US Energy Information Administration
ERV:	energy recovery ventilator
EUI:	energy use intensity
EUL:	end of useful life
FCU:	fan coil unit
GHG:	greenhouse gases
HDD:	heating degree days
HVAC:	heating, ventilation, and air conditioning
HX:	heat exchanger
IAQ:	indoor air quality
kBTU:	one thousand British thermal units
kW:	kilowatt
kWh:	kilowatt hour
MCDEP:	Montgomery County Department of Environmental Protection
N/A:	not applicable
O&M:	operations and maintenance
PV:	photovoltaic
RECS:	Residential Energy Consumption Survey
RCx:	retro-commissioning
RTU:	roof top unit
SCU:	self-contained unit
SF:	square feet
SHGC:	solar heat gain coefficient
SP:	simple payback
SRECs:	solar renewable energy credits
SWA:	Steven Winter Associates
US:	United States
VAV:	variable air volume
VFD:	variable frequency drive
VRF:	variable refrigerant flow
WSHP:	water source heat pump

Proposed Amendments Agreed to By Climate Partners

Uploaded by: Diana Younts

Position: FWA

maryland climate partners

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):
  A. The Installation of Solar Energy Systems
    - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
    - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
    - Will be 20 stories or less in height, above grade plane.

  B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
    - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
    - shadow studies indicate that 25% of a building's roof area will be in shadow.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

E. For all other new covered buildings

- A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received

F. MAJOR RENOVATIONS – Energy Conservation

. "Major Renovation" means a renovation project:

- For which the total projected cost exceeds 50% of the assessed value of the existing building; or
- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25–year period for all buildings funded at least 25% by the State.
- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
  - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
  - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
  - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well

    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero energy should be net-zero energy ready.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

  OR

  Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

SB0528-EHE_MACo_SWA.pdf
Uploaded by: Dominic Butchko
Position: FWA

MARYLAND Association of COUNTIES

Senate Bill 528

Climate Solutions Now Act of 2022

MACo Position: **SUPPORT WITH AMENDMENTS**

To: Education, Health, & Environment Affairs and Budget & Taxation Committees

Date: February 15, 2022

From: Dominic J. Butchko

The Maryland Association of Counties (MACo) **SUPPORTS** SB 528 **WITH AMENDMENTS**. This wide-ranging legislation creates and enhances multiple goals to advance Maryland's climate response. County governments appreciate a number of refinements to the bill as introduced, but raise concerns with certain components that appear to be unreasonably burdensome for public sector landfill operators, and may materially undermine local tax revenues.

Methane regulation and public sector landfills

SB 528 imposes a California-style methane standard, that would place a significant burden on county governments to control methane emissions from current and former landfills. This new significant cost could have serious and potentially harmful implications on existing and planned landfill solar installations on landfill acreage. MACo supports amendments to these sections of the bill that seek a balance among multiple goals: controlling methane emissions, retaining the benefits of solar energy, and governing the cost burden on taxpayers and other public services.

A rigid mandate may place burdens on landfill operators that fail a sensible cost-benefit analysis. A reasonable enforcement regime could recognize the current benefits of waste-to-energy adaptations already in place, and in particular respect any clean energy infrastructure already attached to the landfill space. The burden of disassembling solar power arrays, completing expensive retrofits or replacements to existing gas combustion equipment, hiring of additional staff due to increased monitoring requirements, hiring of outside consultants to meet new technical requirements, etc. could make many current and planned installations financially untenable.

MACo proposes five principles for amendments to best align these sections of the bill:

1. Provide State resources for any mandated aerial study flights or other new testing methods envisioned under the new law;

2. Authorize the Maryland Department of the Environment (MDE) to provide regulatory variances based on actual site emission data or models; activities such as voluntary

implementation of landfill gas management systems for sites below Title V mandatory active gas management thresholds; implementation of organics composting systems; or enclosed organics Anaerobic Digestion with gas capture that otherwise reduce greenhouse gases as well as other science-based evidentiary variance requests;

3. Include State funding for MDE to conduct research validating the accuracy of existing data-gathering under the current CFR monitoring requirements and practices;

4. Specify that new compliance costs will not exceed 10% of a county's existing gas management cost per ton of methane captured, and that if costs exceed 10% without an equivalent increase in actual gas capture, then all new compliance activities be allowed to revert to prior compliance standards; and

5. Grandfather in, either by definition or by a reasonable waiver process, currently closed landfills with other greenhouse reduction components in place – such as solar power arrays on closed landfills – recognizing their nonexistent capacity to generate new revenues, and exempting them from any new requirements.

Personal Property Taxation of Solar Property

SB 528 would provide a mandatory, not discretionary, property tax exemption for certain classes of solar energy-generating property. The tax provisions in SB 528 mirror those in SB 264 and may benefit from a fuller consideration in that stand-alone legislation.

MACo would appreciate broad flexibility to enact solar tax incentives locally, as many counties are promoting solar projects on rooftops, brownfields, or less desirable lands as alternatives to large-scale energy generation facilities. However, the fiscal effects of these proposed changes are a major variable, especially as community solar becomes more viable and other currently pending legislation seeks to dramatically expand the capacity limits for "community solar" in the definition to which these tax benefits are pinned. This bill could significantly undermine local revenues and support for essential services and community needs.

As such, MACo urges a "local option amendment" to allow each jurisdiction that chooses to enact these incentives the flexibility to meet specific local needs and priorities. Additionally, this will give each county broad discretion to determine how much revenue it is willing to forego to provide the desirable benefits encouraged by the bill.

The bill as written seeks to accomplish a long list of lofty policy aspirations. Specific parts of the far-reaching bill represent a significant operational and cost mandate —and revenue loss—for county governments. Accordingly, MACo urges the Committee to issue a report of **FAVORABLE WITH AMENDMENTS** for SB 528 and stands ready to work with the Committee to address these issues.

CLPP testimony SB528 021422.pdf
Uploaded by: Donald M. Goldberg
Position: FWA

Climate Law & Policy Project

Committee: Education, Health, and Environmental Affairs
Testimony on: SB0528 Climate Solutions Now Act of 2022
Submitted by: Donald M. Goldberg, Executive Director
Position: Favorable with amendments
Hearing Date: February 15, 2022

Climate Law & Policy Project urges a favorable report on Senate Bill 528. While we strongly support the bill in its current form, we believe it could be improved by the following amendments, several of which are technical.

CLPP is a member of Maryland Climate Partners and fully supports all the amendments submitted by that group. We are recommending an alternative approach for net-zero ready schools in the event that the Partners' proposed amendments regarding net-zero or net-zero ready schools are rejected.

Our main concern is that the requirement that each school district build one net-zero energy (NZE) school through June 2033 is far too limited. The cost of the three NZE schools built in Maryland demonstrate that the cost of a NZE school, inclusive of panels, is comparable to the cost of a conventional school. The two most recent NZE schools, Holabird Academy and Graceland Park/O'Donnell Heights, were constructed for the same cost as a conventional school, panels included. All these schools are much cheaper to operate. For more detail, please see Attachment A.

Wilde Lake's solar panels generate twice as much energy as the school consumes. We believe, particularly when operating costs are taken into consideration, it is fiscally imprudent to continue to build conventional schools. We therefor propose a requirement that all PK-12 schools not built to net-zero standards be net-zero ready, subject to IAC waiver based on cost. By net-zero ready, we mean everything that is included in a net-zero energy school except the installation of solar panels.

Proposed substantive amendments:

- Article — Education, Section 5-312.

(a) In this section, "high performance building" has the meaning stated in § 3–602.1 of the State Finance and Procurement Article.

[(b)**]** **IN THIS SECTION, "NET–ZERO READY" MEANS NET–ZERO ENERGY WITHOUT INSTALLED SOLAR PANELS BUT READY FOR INSTALLATION.**

(b) This section applies to the construction of new schools that have not initiated a Request For Proposal for the selection of an architectural and engineering consultant on or before July 1, 2009.

(c) **(1)** **[**Except**]** **SUBJECT TO PARAGRAPH (2) OF THIS SUBSECTION, AND EXCEPT** as provided in subsection (d) of this section, a new school that receives State public school construction funds shall be constructed to be a high performance building.

(2) (I) EXCEPT AS PROVIDED IN SUBPARAGRAPH (II) OF THIS PARAGRAPH, THE NET–ZERO ENERGY REQUIREMENTS THAT APPLY FOR A BUILDING

TO MEET THE DEFINITION OF A "HIGH PERFORMANCE BUILDING" UNDER § 3–602.1 OF THE STATE FINANCE AND PROCUREMENT ARTICLE DO NOT APPLY TO PUBLIC SCHOOL BUILDINGS.

(II) SUBJECT TO THE AVAILABILITY OF FUNDING FROM THE NET–ZERO SCHOOL GRANT FUND ESTABLISHED UNDER § 9–2010 OF THE STATE GOVERNMENT ARTICLE, AT LEAST ONE OF THE SCHOOLS CONSTRUCTED IN EACH LOCAL SCHOOL SYSTEM FROM JULY 1, 2023, THROUGH JUNE 30, 2033, INCLUSIVE, SHALL BE CONSTRUCTED TO MEET NET–ZERO ENERGY REQUIREMENTS.

(III) A NEW SCHOOL THAT RECEIVES STATE PUBLIC SCHOOL CONSTRUCTION FUNDS THAT IS NOT CONSTRUCTED TO MEET NET–ZERO ENERGY REQUIREMENTS SHALL BE CONSTRUCTED TO MEET NET–ZERO READY REQUIREMENTS.

(d) (1) The Interagency Commission shall establish a process to allow a school system to obtain a waiver from complying with subsection (c) of this section.

(2) The waiver process shall:

(i) Include a review by the Interagency Commission to determine if the construction of a high performance building is not practicable; and

(ii) Require the approval of a waiver by the Interagency Commission.

(3) THE INTERAGENCY COMMISSION SHALL WAIVE THE REQUIREMENTS OF SUBSECTION (C)(2)(II) OF THIS SUBSECTION IF THE INTERAGENCY COMMISSION DETERMINES THAT:

(I) THE CONSTRUCTION OF A NET–ZERO ENERGY SCHOOL BUILDING IS NOT PRACTICABLE BECAUSE OF SPATIAL LIMITATIONS AT THE BUILDING SITE; OR

(II) WHEN TAKING INTO CONSIDERATION THE AVAILABILITY OF STATE COST SHARE FUNDS AND GRANTS FROM THE NET–ZERO SCHOOL GRANT FUND ESTABLISHED UNDER § 9–2010 OF THE STATE GOVERNMENT ARTICLE, THE COST TO THE LOCAL JURISDICTION OF CONSTRUCTING A NET–ZERO ENERGY SCHOOL BUILDING WOULD EXCEED THE COST OF CONSTRUCTING A TRADITIONAL, HIGH PERFORMANCE SCHOOL BUILDING.

(4) THE INTERAGENCY COMMISSION SHALL WAIVE THE REQUIREMENTS OF SUBSECTION (C)(2)(III) OF THIS SUBSECTION IF THE INTERAGENCY COMMISSION DETERMINES THAT:

(I) THE CONSTRUCTION OF A NET–ZERO READY SCHOOL BUILDING IS NOT PRACTICABLE BECAUSE OF SPATIAL LIMITATIONS AT THE BUILDING SITE; OR

(II) WHEN TAKING INTO CONSIDERATION THE AVAILABILITY OF

Climate Law & Policy Project

STATE COST SHARE FUNDS, THE COST TO THE LOCAL JURISDICTION OF CONSTRUCTING A NET–ZERO READY SCHOOL BUILDING WOULD EXCEED THE COST OF CONSTRUCTING A TRADITIONAL, HIGH PERFORMANCE SCHOOL BUILDING.

(e) For fiscal years 2010 through 2014 only, the State shall pay 50% of the local share of the extra costs, identified and approved by the Interagency Commission, that are incurred in constructing a new school to meet the high performance building requirements of this section.

(f) **(1)** The Interagency Commission shall adopt regulations to implement the requirements of this section.

(2) IN IMPLEMENTING NET–ZERO ENERGY REQUIREMENTS FOR SCHOOL BUILDINGS, THE INTERAGENCY COMMISSION SHALL CONSULT WITH THE CLIMATE TRANSITION AND CLEAN ENERGY HUB ESTABLISHED UNDER § 9–2011 OF THE STATE GOVERNMENT ARTICLE.

- Article — State Government, Section 9-2010.

Delete subsections (C) AND (G)(1) and replace with:

(C) THE PURPOSE OF THE FUND, IN ORDER OF PRIORITY, IS TO:

1. ASSIST LOCAL SCHOOL SYSTEMS TO COVER THE COST DIFFERENCE BETWEEN MEETING THE BASIC HIGH PERFORMANCE BUILDING REQUIREMENTS AND THE NET–ZERO ENERGY REQUIREMENTS UNDER §3–602.1 OF THE STATE FINANCE AND PROCUREMENT ARTICLE; AND

2. ASSIST LOCAL SCHOOLS SYSTEMS TO COVER THE COST OF RETROFITTING EXISTING BUILDINGS TO MAXIMIZE EFFICIENCY AND ELIMINATE THE USE OF FOSSIL FUELS.

(G) (1) THE FUND MAY BE USED ONLY FOR PROVIDING LOCAL SCHOOL SYSTEMS WITH GRANTS OF UP TO $3,000,000 TO COVER:

(I) THE COST DIFFERENCE BETWEEN MEETING THE HIGH PERFORMANCE BUILDING REQUIREMENTS AND THE NET–ZERO ENERGY REQUIREMENTS UNDER § 3–602.1 OF THE STATE FINANCE AND PROCUREMENT ARTICLE; AND

(II) THE COST OF RETROFITTING EXISTING BUILDINGS TO MAXIMIZE EFFICIENCY AND ELIMINATE THE USE OF FOSSIL FUELS IN SCHOOL BUILDINGS.

- Article — Environment, Section 2-1505(c)(2): Modify to read: **"The county board, having made a good faith effort to obtain federal, state, or private funding sufficient to cover the incremental costs associated with contracting for the purchase or use of school buses that are zero-emission vehicles, is unable to obtain such funding.**"

The goal is to have boards of education try to go zero-emission. They should have to at least try to get funding to cover the incremental costs, not just say they couldn't get funding.

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- 4-809(f)(6): Change **"ensure that" to "provide guidance and assistance to help"**.

The Maryland Green Building Council should be provided with enforcement authority that would enable it to ensure the high performance building requirements are met.

Technical amendments:

- 2-407:
  - (B): Change "aircraft observations" to **"aircraft or satellite observations"**.
  - (C) (1) "airplane observations" and (2) "aircraft observations": Same modification.
  - 2-1206(9) "aircraft observations": Same modification.
- 2-1206(8)(vi): Delete, create a new number (8) (adjusting the rest of the numbering accordingly, i.e., making the current 8 into 9, etc.), and make the new (8): **"Consider the net effect on the State's economy and the number of jobs in the State"**.
- 2-1303.1(C)(12): Change "American Wind Energy Association" to **"American Clean Power Association"** (AWEA doesn't exist anymore. It is now part of ACPA.)
- Section 5 and Section 6 of the bill are duplicative. They are the same revisions of 2-1602. Delete one.

Attachment A

Construction Costs of Net-Zero Energy Schools in Baltimore and Howard County

Included below are construction costs for three new NZE schools and the energy use of Wilde Lake Middle School, which is actually net negative — it produces more energy than it consumes. Due to COVID-19, one-year performance data for Holabird Academy and Graceland Park/O'Donnell is not yet available. Wilde Lake has an energy use intensity (EUI) of 13.7 kBTU per square foot per year and produces *twice as much energy* as it consumes. For comparison, Montgomery County Public Schools have an average EUI of 54 kBTU per sf/yr.

According to the Interagency Commission on School Construction, Maryland average school construction costs with site preparation from 2015 to 2021 have ranged from $261 to $405 per square foot.[1]

Bid Year	Without Site Preparation (per square foot)	With Site Preparation (per square foot)
2021	$341	$405
2020	$329	$392
2019	$318	$378
2018	$302	$360
2017	$293	$349
2016	$282	$336
2015	$233	$261

[1] https://iac.mdschoolconstruction.org/?page_id=4633

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Wilde Lake Middle School, Columbia ($320 per square foot with site preparation & solar panels)

- Net-Zero LEED Platinum
- Completion date: August 2017
- Bid year: 2015
- Construction cost, including site preparation and solar panels: $34,000,000
- Gross square feet: 106,221
- Energy produced during performance period: 821,618 kWh
- Energy use during performance period: 428,301 kWh
- Net Energy Use: -393,317 kWh (net-negative)
- Energy Use Intensity: 13.7 kBTU/sf/yr

Graceland Park / O'Donnell Heights Elementary/Middle School, Baltimore ($358 per square foot, with site preparation & solar panels)

- Net-Zero LEED Platinum
- Completion date: September 2020
- Bid year: 2018
- Construction cost, including site and solar panels: $33,752,000
- Gross square feet: 94,070
- Energy performance not yet determined due to COVID-19

Holabird Academy, Baltimore ($364 per square foot with site preparation & solar panels)

- Net-Zero LEED Platinum
- Completion date: September 2020
- Bid year: 2018
- Construction cost, including site and solar panels: $34,330,500 Gross square feet:
- Gross square feet: 94,070
- Energy performance not yet determined due to COVID-19

msbca testimony on sb climate solutions.pdf
Uploaded by: Erin Appel
Position: FWA

February 15, 2022

The Honorable Paul Pinsky and Members
Education, Health & Environmental Affairs Committee
Miller Senate Building
Annapolis, MD 21401

Re: FAV WITH AMENDMENT – SB 528 – Climate Solutions Now Act of 2022

Dear Chairman Pinsky and Members of the Committee:

The Maryland School Bus Contractors Association (MSBCA) **supports with one crucial amendment** SB 528 – Climate Solutions Now Act of 2022. MSBCA serves as the voice of the private school bus companies that contract with local Maryland school systems in 18 of Maryland's 24 jurisdictions to own and operate the nearly 3500 contracted school buses that transport schoolchildren across the State. MSBCA remains committed to the safety of the students they transport and considers it a privilege to do so.

MSBCA applauds the ambitious goals of SB 528, including the goal of eventually transitioning all public school buses in the State to zero-emission vehicles. However, the current relevant language in the bill is extremely problematic in that it prohibits a school board, beginning in 2024, from entering "into a new contract for the purchase or use of any school bus that is not a zero-emission vehicle." Our contracts with the school boards we serve vary greatly from county to county, as do the terms of those contracts. Some renew year to year, some contracts are for 6 or 12 year periods. By law the school buses we purchase and operate may run for up to 15 years. Many school bus contractors have already placed orders for new diesel buses for the 2022-2023 school year. By prohibiting a school board from entering into a contract for the use of a diesel school bus beginning in 2024, SB 528 would in essence be rendering huge portions of our school bus fleets worthless.

Rather, we would ask that you honor the 15-year life of the vehicles already in our fleets beginning in 2024 and base the "trigger" for transitioning out diesel buses as the date the vehicle is placed in service.

In Maryland, we don't have huge national contractor companies like they do in other states. Most of us are small family-owned companies that would be severely hurt and likely put out of business by this prohibition.

Once again, MSBCA asked that you amend this portion of the bill to reflect the terms of our existing contracts and the 15-year life of the buses in our existing fleets. Our proposed amendment language is attached herein.

Thank you for your consideration and your commitment to our State.

Sincerely,

Steve Nelson

Steve Nelson, President
1 State Circle, Annapolis, MD 21401
410.268.3099

PROPOSED AMENDMENT
SB 528 – CLIMATE SOLUTIONS NOW ACT OF 2022

On page 23, line 5 –

(B) Except at provided in subsection (C) of this section, beginning in fiscal year 2024, a county board of education may not enter into a new contract for the purchase or use of any school bus that is not a zero-emission vehicle ***unless the school bus has been in service for less than 15 years and was purchased before January 1, 2023***.

2022 SB 528 CR MoCo.pdf
Uploaded by: Frances Stewart
Position: FWA

BILL:	**SB 0528**
TITLE:	**Climate Solutions Now**
POSITION:	**Favorable with amendments**
HEARING DATE:	**2/15/2022**
COMMITTEE:	**Education, Health, and Environmental Affairs**
SPONSOR:	**Senator Paul Pinsky**

Climate Reality Montgomery County stongly supports **SB0528 - Climate Solutions Now Act of 2022.** We would like to thank the sponsor, Senator Pinsky, for introducing this important piece of legislation. We would also like to offer several amendments that strengthen the legislation (attached).

Climate Solutions Now is a crucial piece of legislation that sets ambitious but achievable climate goals and outlines a plan to reach them. We support this legislation because it addresses the top three emitting sectors –transportation, energy consumption, and buildings– while centering environmental justice concerns and promoting climate equity.

Historically, low-income communities and people of color have borne disproportionate negative impacts from dirty energy use and climate change. Through the creation of a Climate Catalytic Capital Fund and a Climate Justice Corps, the Climate Solutions Now Act of 2022 aims to support projects to reduce GHG emissions in overburdened communities and invest in a "green-collar" workforce. We urge the sponsor to work with colleagues to collaborate with programs such as the Maryland Corps Program and the proposed Maryland Civilian Climate Corps (proposed in SB228) to ensure that the jobs created to promote climate justice and clean energy projects are well paid and benefitted. Additionally, we strongly support the provisions that direct the Maryland Department of the Environment to conduct research and data gathering on cumulative impacts and overburdened communities, in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities. It is important that these duties are properly staffed and lead to the establishment of strategies to address environmental justice and advance climate equity, including goals for funding directed to disproportionately affected communities. We offer minor amendments to improve this provision.
We believe that the state should be leading by example in electric vehicle adoption. Climate Solutions Now does exactly this by requiring that a portion of the passenger cars purchased for the state fleet be ZEV starting in the fiscal year 2023 and reaching 100% by 2027 and a portion of all light-duty vehicles purchased for the state fleet be ZEV starting in the fiscal year 2028 and reaching 100% by 2033.

Because buildings emit 40% of Maryland's greenhouse gases (13% of which are direct emissions) and account for 90% of Maryland's electricity use, improving building energy

performance and transitioning buildings off of fossil fuels is crucial to reaching Maryland's climate commitments. We strongly support these provisions in Climate Solutions Now and offer minor amendments to strengthen them.

Finally, we commend the bill sponsor for including provisions to extend the EmPOWER Maryland program and increase the annual efficiency gains. This program is a critical tool in mitigating the energy burden our most vulnerable residents face. However, we recognize an urgent need to better align this program with our climate goals. Whether in SB528 (pg. 36-37) or in complementary legislation, we support making revisions to the EMPOWER program to better support our climate goals and energy needs. We are agnostic to the legislative vehicle for these changes but acknowledge the urgency due to the 2023 sunset of EMPOWER without legislative action. Reform should include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions
- Modifying Empower to focus on electrification and prohibit use of Empower support for new fossil fuel. (refer to HB708, pg 24, lines 5-20)

We look forward to working with the bill sponsor and leaders throughout the legislature on these proposed amendments.

With 3,000 miles of tidal shoreline, Maryland is one of the most climate-vulnerable states in America – just from sea-level rise. In Montgomery County, we have had serious flooding, including a recent flash flood that killed a young man in Rockville. We are also vulnerable to heatwaves, other extreme weather events, and all the problems with that come from poor air quality.

We must act now to address the climate crisis. We need ambitious goals and a realistic plan to meet them. Therefore, we urge a favorable vote from the committee with the inclusion of these amendments.

Respectfully submitted,

Frances Stewart
Chapter Chair
Climate Reality Montgomery County
301-461-2451

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):
    A. The Installation of Solar Energy Systems
        - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
        - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
        - Will be 20 stories or less in height, above grade plane.

    B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
        - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
        - shadow studies indicate that 25% of a building's roof area will be in shadow.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

F. "Major Renovation" means a renovation project:

- For which the total projected cost exceeds 50% of the assessed value of the existing building; or
- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

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- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero energy should be net-zero energy ready.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -

- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. “Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a ‘high performance building” under § 3-602.1 12 of the state finance and procurement article

  OR

  Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
  - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
  - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

2022 SB0528 ECA.pdf
Uploaded by: Frances Stewart
Position: FWA

BILL:	**SB 0528**
TITLE:	**Climate Solutions Now**
POSITION:	**Favorable with amendments**
HEARING DATE:	**2/15/2022**
COMMITTEE:	**Education, Health, and Environmental Affairs**
SPONSOR:	**Senator Paul Pinsky**

Elders Climate Action Maryland stongly supports **SB0528 - Climate Solutions Now Act of 2022.** We would like to thank the sponsor, Senator Pinsky, for introducing this important piece of legislation. We would also like to offer several amendments that strengthen the legislation (attached).

Climate Solutions Now is a crucial piece of legislation that sets ambitious but achievable climate goals and outlines a plan to reach them. We support this legislation because it addresses the top three emitting sectors –transportation, energy consumption, and buildings– while centering environmental justice concerns and promoting climate equity.

Historically, low-income communities and people of color have borne disproportionate negative impacts from dirty energy use and climate change. Through the creation of a Climate Catalytic Capital Fund and a Climate Justice Corps, the Climate Solutions Now Act of 2022 aims to support projects to reduce GHG emissions in overburdened communities and invest in a "green-collar" workforce. We urge the sponsor to work with colleagues to collaborate with programs such as the Maryland Corps Program and the proposed Maryland Civilian Climate Corps (proposed in SB228) to ensure that the jobs created to promote climate justice and clean energy projects are well paid and benefitted.

Additionally, we strongly support the provisions that direct the Maryland Department of the Environment to conduct research and data gathering on cumulative impacts and overburdened communities, in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities. It is important that these duties are properly staffed and lead to the establishment of strategies to address environmental justice and advance climate equity, including goals for funding directed to disproportionately affected communities. We offer minor amendments to improve this provision.

We believe that the state should be leading by example in electric vehicle adoption. Climate Solutions Now does exactly this by requiring that a portion of the passenger cars purchased for the state fleet be ZEV starting in the fiscal year 2023 and reaching 100% by 2027 and a portion of all light-duty vehicles purchased for the state fleet be ZEV starting in the fiscal year 2028 and reaching 100% by 2033.

Because buildings emit 40% of Maryland's greenhouse gases (13% of which are direct emissions) and account for 90% of Maryland's electricity use, improving building energy performance and transitioning buildings off of fossil fuels is crucial to reaching Maryland's climate commitments. We strongly support these provisions in Climate Solutions Now and offer minor amendments to strengthen them.

Finally, we commend the bill sponsor for including provisions to extend the EmPOWER Maryland program and increase the annual efficiency gains. This program is a critical tool in mitigating the energy burden our most vulnerable residents face. However, we recognize an urgent need to better align this program with our climate goals. Whether in SB528 (pg. 36-37) or in complementary legislation, we support making revisions to the EMPOWER program to better support our climate goals and energy needs. We are agnostic to the legislative vehicle for these changes but acknowledge the urgency due to the 2023 sunset of EMPOWER without legislative action. Reform should include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions
- Modifying Empower to focus on electrification and prohibit use of Empower support for new fossil fuel. (refer to HB708, pg 24, lines 5-20)

We look forward to working with the bill sponsor and leaders throughout the legislature on these proposed amendments.

With 3,000 miles of tidal shoreline, Maryland is one of the most climate-vulnerable states in America – just from sea-level rise. We are also experiencing more extreme weather events including two "1000-year floods" to Ellicott City in just 22 months. We must act immediately to address climate change. We must update our climate commitments and enact a plan to reach them.

Elders Climate Action has as its mission providing a livable planet to the grandchildren and all life. We believe this bill can move us toward that vital goal. Therefore, we urge a favorable vote from the committee with the inclusion of these amendments.

Respectfully submitted,

Leslie Wharton
Chapter Leader
Elders Climate Action Maryland
202-213-3252

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):
    A. The Installation of Solar Energy Systems
        - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
        - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
        - Will be 20 stories or less in height, above grade plane.
    B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
        - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
        - shadow studies indicate that 25% of a building's roof area will be in shadow.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

F. "Major Renovation" means a renovation project:

- For which the total projected cost exceeds 50% of the assessed value of the existing building; or
- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25–year period for all buildings funded at least 25% by the State.
- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero energy should be net-zero energy ready.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -

- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. “Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a ‘high performance building” under § 3-602.1 12 of the state finance and procurement article

  OR

  Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
  - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
  - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

Cc: Members of the Education, Health, and Environmental Affairs

SB 528_CHESSA_FWA.pdf
Uploaded by: Isaac Meyer
Position: FWA

Favorable with Amendment
Senate Bill 528
Climate Solutions Now Act of 2022

Education, Health and Environmental Affairs Committee
February 15, 2022

Honorable Paul Pinsky
Chair, Education, Health, and
Environmental Affairs
3 West
Miller Senate Office Building
Annapolis, Maryland 21401

Chair Pinsky, Vice-Chair Kagan, and members of the Committee,

On behalf of the Chesapeake Solar and Storage Association (CHESSA), thank you for the opportunity to issue our **Support** of **Senate Bill 528** (we do have one corrective amendment discussed below). The impact of climate change can no longer be debated. The causes are numerous and, therefore, the solution must be comprehensive. CHESSA believes SB 528 represents the comprehensive solution that Maryland needs to address climate change through taking aggressive actions to reduce greenhouse gas reductions.

There are several provisions specific to the solar industry that CHESSA strongly supports:

- Requiring electric ready standards in new buildings that ensures they are ready for installation of solar energy systems
- Waiving county and municipal personal property tax incentives for certain community solar projects that serve low- and moderate-income households
- Requiring State facilities to procure 75% of their energy supply from low-carbon sources, including solar, by 2030
- Convening stakeholders to discuss new opportunities for workforce training in renewable energy, especially targeting those underrepresented in the industry.

Additionally, CHESSA would like to offer one corrective amendment. CHESSA was formerly known as MDV-SEIA but recently changed its name to better reflect our organization scope.

Amendment

Amendment No. 1
On page 18, in line 8 and 9, strike "~~**MARYLAND-DC-DELAWARE-VIRGINIA SOLAR ENERGY INDUSTRIES**~~" and replace with "**CHESAPEAKE SOLAR AND STORAGE**"

Thank you for your consideration of our testimony.

Submitted by:
Isaac Meyer, Compass Government Relations Partners, on behalf of CHESSA

CBT Testimony - SB 528.pdf
Uploaded by: Jana Davis
Position: FWA

Senate Bill 528 Climate Solutions Now Act of 2022
(Senator Pinsky) –
Written Testimony

Date: February 15, 2022 **Position: SUPPORT WITH AMENDMENTS**

Submitted to: Senate Education, Health, and Environmental Affairs
Submitted by: Jana Davis, President, Chesapeake Bay Trust

The Climate Solutions Now Act of 2022 includes several components, one of which is to establish a Maryland Climate Justice Corps to be administered by the Chesapeake Bay Trust in a manner very similar to the Chesapeake Conservation Corps created by the General Assembly in 2010. The Chesapeake Bay Trust (the Trust) would be honored to administer the Climate Justice Corps. We therefore support the Climate Corps component of the bill, with two amendments:

1) one minor amendment to streamline administration, reduce overhead cost, and take advantage of some of the infrastructure already in place to administer the Chesapeake Conservation Corps because the two programs are so similar (e.g., expanding an existing Corps Advisory Board, rather than creating a second Corps Advisory Board),

2) one amendment to articulate the source and level of funding for the Climate Corps (general fund) since the Trust does not receive a direct appropriation to support its work but rather operates on partnerships and voluntary non-state funds.

The Trust would welcome additional amendments to strengthen the role of Morgan State University in the Climate Corps.

Background on the Chesapeake Conservation Corps on which the Climate Corps is modeled

The language in the bill creating the Maryland Climate Justice Corps (new code sections 8-19297-1938 in SB 528) is modeled on the statutory language creating Chesapeake Conservation Corps (existing code sections 8-1913-1924). Aa a result, the Trust will be able to seamlessly create the new Climate Corps with minimal additional administration/overhead. The Climate Corps will be able to take advantage of structural elements of the Conservation Corps, which annually places 30-40 young people in year-long, stipend-supported terms of service at host not-for-profit entities across the region. The young people in both Corps will/do 1) work on a project to advance their Host Organizations' missions in the realms of infrastructure, watershed restoration, energy conservation, agriculture, and K-12 education (expanding their Host Organizations' capacity), 2) receive life and career skills training, and 3) learn to lead their own independent projects (including developing budgets and managing grants). Host Organizations include

environmental and non-environmental entities (e.g., faith institutions, local governments, school systems, civic associations with social missions, etc.) alike.

The Chesapeake Conservation Corps already hosts many members who work on climate-related topics: K-12 climate education, shoreline and coastal resiliency, tree planting and forest management, energy efficiency projects, infrastructure projects, and more. Demand for the Chesapeake Conservation Corps far exceeds available resources: Each year we can support 35-40 member-host placements, but generally close to 100 prospective members apply and 70-80 not-for-profits organizations vie to serve as hosts for one or more members. The new Climate Corps, therefore, will be able to be efficiently initiated and populated.

In addition, we expect similar success of the Climate Corps to its existing sister Conservation Corps. In its first 12 years, 318 alums have completed the Conservation Corps program. Thirty percent of Corps members are immediately hired by their Host Organizations or another host in the program, many into new jobs that were made possible by the expanded capacity at the Host Organization driven by the Corps member's service.. Hundreds of organizations have served as Host Organizations, many of which expanded in size during this period and have filled their staffs with Corps alums.

About the Chesapeake Bay Trust

The Trust was created by the Maryland General Assembly in 1985 as a non-profit grant-making organization with a goal to increase stewardship and citizen engagement in the restoration of the state's local rivers, streams, parks, and other natural resources in diverse communities across the state, from the mountains of Western Maryland and the Youghiogheny watershed to the marshes of the Coastal Bays. The goal was to create an entity that could complement state agency work numbers of groups on the ground: schools, nonprofit organizations, faith-based and reach large institutions, homeowners associations, community and civic associations, and other types of groups.

The Trust invests in local communities and watersheds through grant programs and special initiatives and is known for its efficiency, putting on average 90 cents of every dollar into programs. The Trust has awarded over $130 million through more than 12,000 grants and projects in every county in Maryland since 1985.We make 350-400 grants and other awards a year and have about 1,000 active grantees at any one time.

The Trust does not receive a direct state appropriation, instead supported through revenue from the Chesapeake Bay vehicle license plate; half of the Chesapeake and Endangered Species Fund checkoff on the state income tax form; two new donation options through Maryland's online boating, fishing, hunting license system, one that focuses on veterans' rehabilitation; partnerships with federal, state, local agencies, family foundations, and corporate foundations; and individual donors.

Due to its efficiency, the Trust has been rated with the maximum four-star rating by the nation's leading charity evaluator, Charity Navigator, for more than two decades, putting it in the top 1% of non-profits in the nation.

One of the Trust's basic tenets in its strategic plan is to engage under-engaged audiences in natural resources issues, and that theme characterizes the Chesapeake Conservation Corps. Every individual in our area benefits from healthy natural resources, and in turn, every individual can help natural resources. Three under-engaged audiences of particular focus identified by our Diversity and Inclusion Committee are the faith-based sector, communities of color, and the human health sector. The Trust has seen much success: The number of students, volunteers, and teachers of color engaged in our grants match the demographics of Maryland. Close to 10% of our grants supported work at faith-based institutions of 13 different religions.

Thank you very much for the opportunity to present to the Committee. If you should have any questions regarding the Trust's testimony, please contact us at 410-974-2941 x100 or jdavis@cbtrust.org.

WKC Testimony on SB528.pdf
Uploaded by: Jen Brock-Cancellieri
Position: FWA

WATERKEEPERS® CHESAPEAKE

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www.waterkeeperschesapeake.org
CFC#: 31891

SB528: Environment –
Education, Health, and Environmental Affairs Committee
January 28th, 2021
Betsy Nicholas, Waterkeepers Chesapeake

FAVORABLE WITH AMENDMENTS

Waterkeepers Chesapeake fights for clean water and a healthy environment by supporting Waterkeepers throughout the Chesapeake and coastal regions as they protect their communities, rivers, and streams from pollution. Waterkeepers Chesapeake has 17 Waterkeeper program members, representing thousands of residents in Maryland and the region.

We commend Senator Pinsky for his leadership and introduction of such an ambitious and comprehensive legislation proposal to combat climate change before the Maryland General Assembly. Specifically, we support the policies in SB 528 to address the cumulative impacts of pollution on communities who already are overburdened with existing industrial facilities, most often our black and brown communities. The addition of a tool designed by the University of Maryland to identify existing sources of pollution, called the Maryland EJ Screen, could give regulators and residents critical additional data points when making permitting decisions for new sources of pollution.

Thus, in addition to the testimony from the Climate Partners, to which we signed, we have one additional amendment request. Incorporate the intent and language below from SB 818 into page 22, lines 12 to 15:

(A) A PERSON APPLYING FOR A PERMIT UNDER THIS ARTICLE SHALL INCLUDE IN THE PERMIT APPLICATION THE EJ SCORE FROM THE MARYLAND EJSCREEN MAPPING TOOL FOR THE ADDRESS WHERE THE APPLICANT IS SEEKING A PERMIT.

(B) (1) ON RECEIVING A PERMIT APPLICATION UNDER THIS ARTICLE, THE DEPARTMENT SHALL, IN ACCORDANCE WITH REGULATIONS ADOPTED UNDER THIS SECTION, CONDUCT AN ANALYSIS OF THE ADDRESS WHERE THE APPLICANT IS SEEKING A PERMIT USING THE MARYLAND EJSCREEN MAPPING TOOL.

(2) THE DEPARTMENT SHALL CONDUCT THE ANALYSIS REQUIRED UNDER PARAGRAPH (1) OF THIS SUBSECTION BEFORE DECIDING WHETHER TO ISSUE A PERMIT UNDER THIS ARTICLE.

Waterkeepers Chesapeake urges a favorable report with this amendment.

Betsy Nicholas
Executive Director
Betsy@waterkeeperschesapeake.org
202-423-0504

BaltimoreCounty_FWA_SB0528.pdf
Uploaded by: Joel Beller
Position: FWA

JOHN A. OLSZEWSKI, JR.
County Executive

JOEL N. BELLER
Acting Director of Government Affairs

JOSHUA M. GREENBERG
Associate Director of Government Affairs

MIA R. GOGEL
Associate Director of Government Affairs

BILL NO.: **Senate Bill 528**

TITLE: Climate Solutions Now Act of 2022

SPONSOR: Senator Pinsky

COMMITTEE: Education, Health and Environmental Affairs

POSITION: **SUPPORT WITH AMEDMENTS**

DATE: February 15, 2022

Baltimore County **SUPPORTS WITH AMENDMENTS** Senate Bill 528 – Climate Solutions Now Act of 2022. This legislation would provide a comprehensive path forward for Maryland as leaders looks to reduce greenhouse gas emission and ensure a sustainable future.

Baltimore County is committed to tackling the real and significant challenge of climate change. Under the leadership of County Executive Johnny Olszewski, Baltimore County is working to meet 100% of County government's energy demand with renewable energy sources, investing in sustainable infrastructure, and taking the other necessary steps on the local level to operate a green government. Therefore, we support the efforts by this legislation to assist local governments in this pursuit and scale up through the state some of the efforts the County has undertaken.

Specifically, Baltimore County supports provisions which would transition school buses and State fleet vehicles to electric models and to direct State funding toward high efficiency buildings and schools. The County also strongly supports measures in this bill that would identify communities that are being disproportionately impacted by climate change and direct dedicated funding toward solutions for these communities.

In supporting this bill, we recognize that there are some provisions that may unintentionally impede Baltimore County's sustainability goals. SB 528 would require aerial monitoring of methane emissions from municipal landfills and subsequent remedial activity if those measurements reach a certain threshold. The County's solid waste engineers have expressed concerns that this type of monitoring will not be able to effectively differentiate between methane from landfills and other nearby facilities that also emit methane near our landfills. Baltimore County is also concerned that adoption of California's landfill emission standards may require the addition of costly methane monitoring systems at one or both of our closed landfills, potentially disrupting the large-scale solar installations planned at both sites. Clarification of both sections may prove extremely valuable to local jurisdictions.

Baltimore County also requests clarification on the required emissions standards for covered buildings that are owned by the State. It is unclear to County Government whether buildings owned by local governments or institutional buildings, other than public schools, are also subject to these emissions standards. The Division of Property Management advises that 38 different County-owned buildings may be subject to these provisions, and compliance would likely require significant reallocations of funds to retrofit these existing buildings. Baltimore County is eager to work the sponsor and the committee to clarify these concerns.

Accordingly, Baltimore County requests a **FAVORABLE WITH AMENDMENTS** report on SB 528. For more information, please contact Joel Beller, Acting Director of Government Affairs at jbeller@baltimorecountymd.gov.

VE Testimony SB 528.pdf
Uploaded by: John Fiastro
Position: FWA

Senate Bill 528

Climate Solutions Now Act of 2022

Senate Education, Health, and Environmental Affairs Committee

February 15, 2022

Position: FAVORABLE, with amendments

Proposed Amendments

1. Exemption for new building water and space heating demand that allows for district energy hook-up.
2. Inclusion of a representative from the district energy industry on the Building Energy Transition Implementation Task Force.

Vicinity Energy is supportive of SB 528 as it further aligns the state with our own greenhouse gas (GHG) reduction goals. However, we believe the requirement that new buildings meet all water and space heating demand without the use of fossil fuels could have the unintended consequence of prohibiting new buildings from connecting to our district energy network. This unintended consequence would be detrimental to Vicinity's growth in Baltimore as we support a large and growing medical research and life science sector for which steam is essential for both reliability and sterilization. Because of the significant role district energy plays in the future of building decarbonization, we would also recommend adding a representative from the district energy industry to the Building Energy Transition Implementation Task Force.

As explained herein, Vicinity's district energy system is critical to helping the state achieve its GHG reduction goals. While our customer base consists of the vital institutions with mission-critical energy requirements, the environmental benefits extend to all corners of Baltimore, including the environmental justice neighborhoods that are disproportionately affected by fossil fuel pollution. Renewable fuels and electrification play a key role in decarbonization; however, by not providing an exemption for new buildings connecting to the district energy system, this legislation would potentially take an important decarbonization tool out of the state's toolbox.

Vicinity Energy is fully committed to decarbonization and achieving net zero carbon emissions from its operations by 2050. You can read more about Vicinity's path to net

zero on our website (www.vicinityenergy.us/clean-energy-future). In many ways, district energy can be the "easy button" allowing decarbonization across Baltimore City by addressing electrification and renewable energy to be applied at a central location while impacting numerous buildings. For example, Vicinity Energy recently purchased carbon free electricity to produce chilled water.

Vicinity Energy Company Profile

With 19 district energy systems in 12 major cities, Vicinity Energy is the largest provider of district energy solutions in North America. Vicinity produces and distributes steam, hot water, and chilled water directly through its vast underground network, eliminating the need for boiler and chiller plants in individual buildings, improving overall efficiency, lowering carbon footprints, and increasing reliability. In 2020, Vicinity launched a Clean Energy Future roadmap and is committed to reaching net zero carbon emissions across all operations by 2050.

Vicinity Energy in Baltimore

In downtown Baltimore, Vicinity Energy serves over 80 million square feet of commercial space, including Hospitals (UMMC and Mercy), the University of Maryland Baltimore campus, City, State and Federal office buildings, the Housing Authority, Ravens Stadium and Oriole Park at Camden Yards, the Baltimore Convention Center, and numerous hotels, office, retail, and residential buildings. Baltimore's most vital infrastructure benefits from our 99.99% reliability and enhanced resiliency to natural disasters. And our steam, which is more carbon-efficient than onsite fossil fuel burning boilers, will continue to attract more medical research and life science sector jobs for which high pressure steam is essential.

Through a network of over 28 miles of underground pipes, Vicinity distributes reliable steam, hot water, and chilled water to over 245 customers in the central district and Harbor East while lowering the city's GHG emissions by nearly 30,000 tons annually compared to conventional means of heating and cooling buildings. This is the equivalent of removing almost 11,000 cars from the roads every year. District energy is an innovative and resilient energy solution that involves the production of thermal energy at a central plant, eliminating the need to install or manage onsite boilers and chillers. District energy also offers our customers a green energy alternative. Over 50% of the steam distributed throughout the Baltimore system is already derived from renewable energy, and Vicinity is on track to achieve net zero carbon emissions by 2050. Including district energy in a solution for new construction will have the added benefit of easily

reducing GHG emissions for all buildings connected to our district energy system as Vicinity's climate goals are met.

Vicinity also supplies many buildings in the downtown Baltimore business corridor with reliable central chilled water services – offering a cost-effective alternative to replacing, operating, and maintaining in-house cooling equipment. As one of the largest ice thermal storage systems in the U.S., Vicinity's innovate system uses ice to augment electrical chilling capacity during the day. By reducing electricity during peak demand, Vicinity takes pressure of the electrical grid when power usage is at its highest.

In addition to reducing Baltimore's carbon footprint, with district energy, individual buildings do not require onsite boilers or chillers – freeing up space for building amenities and eliminating the risk of onsite combustion. Our interconnected central energy facilities have built in redundancy, back-up generation and multiple water and fuel sources.

Conclusion

In closing, Vicinity thanks the committee for holding this hearing and demonstrating leadership in reducing statewide GHG emissions. We share your commitment to adopting sensible solutions to address climate change and achieve net zero carbon emissions. With the inclusion of an exception for new buildings that connect to a district energy system and the addition of a representative from the district energy industry to the Building Energy Transition Implementation Task Force, Vicinity supports SB 528.

Sincerely,

Mathew Ware

Vice President, Operations

SB 528.Climate Solutions Now 2022.pdf
Uploaded by: John Woolums
Position: FWA

MABE
MARYLAND ASSOCIATION OF BOARDS OF EDUCATION

621 Ridgely Avenue, Suite 300, Annapolis, Maryland 21401
410-841-5414 · 800-841-8197 · Fax: 410-841-6580 · MABE.org

BILL: **Senate Bill 528**
TITLE: **Climate Solutions Now Act of 2022**
DATE: **February 15, 2022**
POSITION: **SUPPORT WITH AMENDMENTS**
COMMITTEE: **Education, Health, and Environmental Affairs**
CONTACT: **John R. Woolums, Esq.**

The Maryland Association of Boards of Education (MABE) supports Senate Bill 528 regarding the provisions directly impacting public school operations, with amendments to address the timing and significant costs of adopting new school construction standards and procurement requirements for school buses.

Regarding school buses, the bill would prohibit local school systems from contracting to purchase or use any school bus that is not a Zero-Emission Vehicle (ZEV), with certain exceptions. This mandate would begin in fiscal year (FY) 2024, which would impact the budgets being developed this fall (2022) to take effect on July 1, 2023. MABE recognizes that the bill would provide a waiver process administered by the Maryland Department of Environment (MDE). However, a waiver may only be granted if MDE determines that no available ZEVs meet the performance requirements for the school system's use or the system is unable to obtain federal, State, or private funding that is sufficient to cover the additional costs associated with contracting for the purchase or use of school buses that are ZEVs. MABE is concerned that FY 2024 is ambitious because MDE must develop a waiver process in time for school systems to secure waivers by later this calendar year and early in 2023. Therefore, MABE requests greater flexibility for school systems in FY 2024 to the extent the waiver process is not fully developed. Importantly, very few school systems have even begun to explore or implement a transition to ZEVs, making the statewide called for in this bill an unprecedented, expensive, and complex initiative.

This legislation would also launch a bold new initiative and program to support the construction of Net-Zero Schools, which are defined as generating as much energy is a year as they consume. MABE greatly appreciates the proposal to create the Net-Zero School Grant Fund and to mandate this annual state funding. Importantly, the bill would mandate that future Governors include in the State Budget $12 million to fund grants to school systems to cover costs associated with building net-zero schools. MABE also appreciates that schools can continue to meet the high-performance building standards for schools without being net-zero, through a waiver based on the availability of funding. Although the bill provides for flexibility and waivers, there are very few net-zero schools in operation in the State, so the expansion of this standard throughout each local school system's construction program will take time and require major investments by both the State and local governments and take time to become the norm. Separately, MABE is concerned that the major investments in building new net-zero schools not negatively impact the availability of state investments of limited resources in less ambitious but very meaningful improvements in the conditions of existing and often aging school buildings.

In the 2022 session, MABE's top school facility funding and policy priorities are the continued funding of the Built to Learn Act and a capital budget that includes a State funding level of at least $400 million for school construction and renovation projects for FY 2023. Together, these programs and funding levels will contribute to the progress of each local school system to build, renovate, and improve school facilities and benefit all students and teachers across the State.

For these reasons, MABE supports Senate Bill 528 specifically as it relates to the incremental and funding-based approach proposed for implementing new school bus procurement and school construction standards, with the amendments and considerations described above.

SB0528 - Climate Solutions Now Act - Testimony - C
Uploaded by: Joseph Jakuta
Position: FWA

Committee: Education, Health, and Environmental Affairs
Testimony on: SB 528 - "Climate Solutions Now Act of 2022"
Organization: Climate Parents of Prince George's
Person Submitting: Joseph Jakuta, Lead Volunteer
Position: Favorable, with Amendments
Hearing Date: February 15, 2022

Dear Mr. Chairman and Committee Members:

Thank you for considering our testimony in support of SB 528 - "Climate Solutions Now Act of 2022." Climate Parents is a campaign to reduce climate change causing pollution in our schools and our group is active in Prince George's County. In particular, we are currently working directly with Prince George's County Public Schools (PGCPS) technical staff and other advocates to develop a Climate Action Plan for PGCPS

The 2018 Intergovernmental Panel on Climate Change (IPCC) Special Report found that limiting global warming to 1.5°C above pre-industrial levels by 2100 would require human-caused emissions of carbon dioxide (CO_2) to fall by about 45 percent from 2010 levels by 2030 and reach 'net zero' by 2050 as a planet. Science gives us the end date for burning fossil fuels and as blessed as we are in Mayland we must lead, we must get there sooner.

SB 528 does just that and provides many tools to make progress in Maryland. We are particularly supportive of the establishment of Building Energy Performance Standards and the requirement to end purchases of diesel powered school buses by FY 2024, though wanted to focus on the area of net-zero schools.

In a 2019 Report from the US Green Building Council, a variety of different buildings were examined, but most germaine, schools.[1] This study assumed an upfront cost of $365/GSF based on an existing net-zero school, which is slightly higher than $320/GSF, which is what the net-zero Wilde Lake was constructed for. Despite the upfront costs, the energy use decreased by 45%, and they projected that net-zero schools would break-even after 13-16 years with a 3-9% decrease in the total cost of ownership over 30 years. This is proof that wise upfront costs pay dividends to the taxpayer.

But is this transferable to Maryland? PGCPS has shown that nearly fossil fuel free schools are not just possible, but are often the best decision financially. PGCPS is relying on a new financing model for six new schools. Of these six schools five will be heated and cooled using geothermal systems rather than fossil fuel, and geothermal was chosen because it was the option that made the most economic sense in light of the 30 year total cost of ownership calculations required by the IAC. It is not just alternatively financed schools where this is possible, PGCPS constructed six elementary schools, one middle school, and one high school with geothermal heating using conventional financing.

Of course there is an upfront cost to realize the long-term savings. That is why the Net-Zero School Grant Fund (NZSGF) is crucial to the success of the program. The NZSGF can provide the additional upfront capital to ensure that the net-zero schools are constructed that will save the taxpayers money and our children's planet.

Concerning amendments, we support the Climate Partners' Priority Amendments for SB 528 that are attached.

[1] US Green Building Council. "Zero Emissions Buildings in Massachusetts: Saving Money from the Start" https://builtenvironmentplus.org/wp-content/uploads/2019/09/ZeroEnergyBldgMA2019.pdf

We must get to net-zero. We are at an inflection point when it comes to our children's future. We implore you to enact this legislation that will require holistic changes in the way we consume energy in Maryland, and to make our schools resilient for years to come, for our children's sake.

We encourage a **FAVORABLE** report, with **AMENDMENT**, for this important legislation.

Attachment - Climate Partners' Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
  - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
  - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
  - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
  - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:

  D. For new covered buildings funded at least 25% by State funds
  - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
  - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
  - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
  - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

  F. "Major Renovation" means a renovation project:
  - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
  - Involving a change of use, if the change involves the application of different requirements of the standards.

  G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:
  - A 40% reduction in the building's average annual energy use; or
  - A 20% reduction in modeled energy use consumption over the current Energy Code.

  H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
  - A 25–year period for all buildings funded at least 25% by the State.
  - A 15–year period for all other buildings.
- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
  - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
  - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.

- The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
- The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6 (12-501(3)(I)(2)(A (under the provision requiring solar ready):
  A. The Installation of Solar Energy Systems
     - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
     - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
     - Will be 20 stories or less in height, above grade plane.
  B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
     - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
     - shadow studies indicate that 25% of a building's roof area will be in shadow.
     - Clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

  OR
- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
  - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
  - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

SB528 - Sierra Club - FWA.pdf
Uploaded by: Josh Tulkin
Position: FWA

SIERRA CLUB
MARYLAND CHAPTER

Sierra Club Maryland Chapter
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Committee: Education, Health, and Environmental Affairs
Testimony on: SB 528 – Climate Solutions Now Act of 2022
Position: Favorable with Amendments
Hearing Date: February 15, 2022

The Sierra Club Maryland Chapter, on behalf of our 70,000 members and supporters, urges a favorable report with amendments on SB528. This legislation is one of the most important bills before the General Assembly this year, and is a Sierra Club priority. To combat the existential threat of climate change, the bill sets ambitious and achievable goals for the state, strengthens existing programs, and launches new programs to ensure that we have a path to achieve these goals. The bill will put Maryland on track to reach net-zero greenhouse gas emissions by 2045. It will promote building energy efficiency standards and electrification, establish climate-related workforce training and mitigation efforts for vulnerable communities, enhance control of methane emissions, expand adoption of zero emission vehicles, and strengthen agencies' planning efforts.

Maryland is an ecological and human treasure that must be protected. We have thousands of miles of shoreline, million acres of farmland (including 20 urban farms), mountain ranges and forests and beaches, and our millions of residents making up a diverse population. Yet climate change is eroding our shorelines and cliffs, bringing changing weather patterns to our crops, removing the snow from our mountains, and threatening the health and economic livelihoods of our populace. This bill is an important step to mitigate further degradation of our natural and human resources.

All the measures included in the bill are important, and we have supported joint testimony, submitted by Chesapeake Climate Action Network, which covers a range of issues. We will focus this testimony on a few key provisions.

Addressing Pollution from our Buildings

With countless commercial [1]businesses currently hooked up to the gas distribution system, as well as the heavy reliance of Maryland households on burning fossil fuels for heating, the building sector is responsible for more climate pollution in Maryland than the state's remaining coal-fired power plants. The Maryland Department of the Environment (MDE) and the Maryland Commission on Climate

[1] Maryland Commission on Climate Change, "2021 Annual Report and Building Energy Transition Plan, Appendix A ("Building Energy Transition Plan"), https://mde.maryland.gov/programs/air/ClimateChange/MCCC/Documents/2021%20Annual%20Report%20Appendices%20FINAL.pdf.

Change have both made it clear that decarbonization of the building sector, with a prioritization of building energy efficiency and electrification pathways, is foundational to achieving mid-century climate commitments.

SB 528 includes two critical policies to reduce pollution from the buildings sector.

The legislation directs MDE to develop a "Building Emission Standard," with the goals of reducing greenhouse gas emissions from state buildings by 50% by 2030, and achieving net-zero emissions by 2035 for public buildings, and, for non-public buildings, achieving a 20% reduction by 2030 and net zero by 2040.

This inclusion of Building Energy Performance Standards (BEPS) is a critical part of Maryland's climate emergency plan. The application of these standards has been found to "produce 50% less greenhouse gasses due to water consumption than baseline buildings, 48% less due to solid waste management, and 5% less due to transportation."[2] These standards are already adopted in Colorado, Virginia, California, Washington, Maine, Nebraska, New Hampshire, Utah, New York, Oregon, and Washington, D.C. As more communities adopt these standards, the less expensive they become to implement. If adopted across the U.S., these standards would help avoid "an estimated 172–405 premature deaths, 171 hospital admissions, 11,000 asthma exacerbations, 54,000 respiratory symptoms, 21,000 lost days of work, and 16,000 lost days of school."[3]

As we confront and seek to remedy climate pollution from buildings, it is important to protect tenants from undue rent increases. We are offering amendments that would do this.

Second, the bill would update the state's building code to provide that new buildings should meet their water and space heating requirements without the use of fossil fuels. The Maryland Commission on Climate Change advises that we need to decarbonize our buildings by 2045, meaning that they would not rely on fossil fuels for heat. It would be completely counterproductive to add fossil fuel infrastructure by including it in new buildings.

The Sierra Club is proposing amendments which would increase energy efficiency targets for new buildings to complement and augment this all-electric requirement.

Electric Vehicle Fleet

Transportation is the largest source of climate-damaging greenhouse gas pollution in Maryland. The transportation sector also is a major source of toxic emissions that are hazardous to human health and are linked to cancers, heart disease, asthma, and other respiratory diseases. Vehicle tailpipe emissions

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[2] Mozingo, Louise, and Arens, Ed. *Quantifying the Comprehensive Greenhouse Gas Co-Benefits of Green Buildings*.

[3] P., M., X., C., J., B. et al. Energy savings, emission reductions, and health co-benefits of the green building movement. J Expo Sci Environ Epidemiol 28, 307–318 (2018). https://doi.org/10.1038/s41370-017-0014-9

also contribute to ozone, smog, and acid rain. More than 85% of Marylanders live in counties that do not meet clean air standards for ozone, due in large part to vehicle tailpipe emissions. According to the Maryland Department of Health (MDH), in 2018 there were 29,534 asthma-related emergency department visits in Maryland. In 2019, MDH also reported that chronic lower respiratory diseases, including asthma, were the fifth leading cause of death in the state. Ground level ozone damages crops, trees and other vegetation. Acid rain affects soil, lakes, streams, and the Chesapeake Bay, and enters into the food chain via water, produce, meat, and fish.

Maryland must look at a range of strategies to dramatically reduce vehicle pollution , including expanding the use of electric vehicles, public transit, smart growth, and bikeable, walkable communities. Whenever possible, state and local governments should lead by example.

SB 528 would require the state to purchase zero-emission passenger cars and other light-duty vehicles for the state vehicle fleet of approximately 5,600 vehicles, with the goal of having 100% of the passenger cars be zero-emission by 2030, and 100% of other light duty vehicles be zero-emission by 2036. The development of charging infrastructure to support the zero-emission vehicles in the state fleet also would be required. Eight other states have already begun electrifying their vehicle fleets (California, Connecticut, Illinois, Minnesota, New Hampshire, North Carolina, Oregon, and Tennessee).

Additionally, the legislation requires the purchase of zero-emission school buses using federal, state or private funding, where available. We also support having local school boards obtain needed funds from electric companies to purchase zero-emission school buses in exchange for allowing the electric companies to access energy from the storage batteries of the buses when they are not in use.

Electrification of vehicles eliminates greenhouse gas emissions and all toxic emissions from vehicle engines. It is good for our environment, our health, and our wallets, too, as EVs have much lower fuel and maintenance costs.

Conclusion

For these reasons, we strongly urge the Committee to favorably report this critical legislation, and, in addition, to include the strengthening amendments we are proposing.

Josh Tulkin
Chapter Director
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301-277-7111

PRIORITY AMENDMENTS - *Developed and submitted for the Climate Partners.*

We endorse the following amendments, developed collaboratively with other climate partners.

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received when (dates missing?)

  F. "Major Renovation" means a renovation project:
    - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
    - Involving a change of use, if the change involves the application of different requirements of the standards.

  G.If a covered building is undergoing a major renovation, the building shall be renovated to achieve:
    - A 40% reduction in the building's average annual energy use; or
    - A 20% reduction in modeled energy use consumption over the current Energy Code.

  H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
    - A 25–year period for all buildings funded at least 25% by the State.
    - A 15–year period for all other buildings.
- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030

- Pages 47, delete lines 18-19 (“PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS”)
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings’ retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- New School buildings that are not net-zero should be net-zero ready
- [Insert on Page 35, following line 6] (12-501(3)(I)(2)(A (under the provision requiring solar ready):

  A. The Installation of Solar Energy Systems
    - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
    - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
    - Will be 20 stories or less in height, above grade plane.

  B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
    - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
    - shadow studies indicate that 25% of a building’s roof area will be in shadow.
    - Clarify the definition of “Solar Ready” to include the 40% roof set aside and the necessary electrical panel and conduit requirements.
- Delete “subject to the availability of funding” on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. “Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a ‘high performance building” under § 3-602.1 12 of the state finance and procurement article

  OR
- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018

International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act
- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

TECHNICAL AMENDMENTS

- The term "Disproportionately affected communities" should be replaced with "overburdened communities." (pg. 10, lines 16, 20, 23-24)
    - The definition of communities that are overburdened needs to include factors beyond climate change indicators.
        - At a minimum, an overburdened community includes any census block group… in which: (1) at least 45 percent of the households qualify as low-income households (defined as a household that is "at or below 200 percent of the federal poverty guidelines"), (2) at least 50 percent of the residents identify as non-white; OR (3) at least 25 percent of the households have limited English proficiency
- Specific to the establishment of goals for the percentage of state funding for GHG emissions reduction measures (page 10 lines 21-24 and page 11 lines 8-11):
    - Explicitly define GHG emissions reduction measures broadly (e.g.: Does it include adaptation measures such as tree planting? Building improvements? etc.)

Schools
- The "Fund Oversight Committee" of the Climate Catalytic Capital Fund should include representatives from overburdened communities and affordable housing communities.

On landfill methane
- subsection 2-408 (page 12), Amend the deadline for adoption of regulations January 2023 or June 2023.

State Fleet Electrification
- On page 42, in line 14, delete "subject to the availability of funding"

Climate Transition and Clean Energy Hub

- Include requirements for a user-friendly website and dashboard for keeping track of the hub's progress and findings. (pg. 45)

Building Performance Standards

- Specify that baseline for percent reductions should be **2023**. Intent is to avoid folks delaying improvements for 2 years. (pg 47)
- Reporting, pg 48, line 15 - specify that reporting should include emissions and breakout electricity use. Updated text should read: *(B) TO FACILITATE THE DEVELOPMENT OF BUILDING EMISSIONS STANDARDS UNDER THIS SECTION, THE DEPARTMENT SHALL REQUIRE THE OWNERS OF COVERED BUILDINGS TO MEASURE AND REPORT DIRECT* ***BUILDING*** *EMISSIONS* ***AND SITE ENERGY USE*** *TO THE DEPARTMENT ANNUALLY BEGINNING IN 2025."*
- *Add new provision to reg guidance to MDE, pg 49, line 3. "*(I) SET A BASELINE AND BUILDING EMISSION STANDARD BY BUILDING TYPE" *The intent with this specifies that regs should set baseline and goals according to building type, following a benchmarking.*
- Designated Affordable housing needs flexible timeline to align with their scheduled recapitalization and refinancing timelines
- Include a representative of the low income, renter, tenants housing community, and an ESCO rep on the Building Energy Transition Implementation Task Force (page 49)
- Edit language for the Building Energy Transition Task Force charge in section (F) (1) to include reduction of direct emissions from the building sector (pg. 51)
- Edit language for the Building Energy Transition Task Force charge in section (F) (2) to ensure the Plan may include recommendations related to aligning and maximizing federal health, safety, weatherization, energy affordability, and electrification resources and programs, and education programs for contractors and installation technicians focused on building electrification solutions (pg. 51)
- Enabling provisions should be added to allow local jurisdictions to establish more stringent energy efficiency and conservation standards for both major renovations and new construction.

Regarding Just Transition Employment Working Group

- Membership of the working group, on pg. 18, lines 5-6 strike "one representative of the Maryland Chapter of the Sierra club, selected by the Maryland Chapter of the Sierra Club" and replace with "Two representatives of the environmental community"
- On page 20, line 7, strike "counter" and substitute "address".
- Fenceline communities should be defined (page 20, line 16)

Regarding school bus electrification

- When referring to the "cost difference between purchasing and operating" on Page 22 line 26, clarify that this includes "purchasing, deploying (infrastructure), administrative and operating costs, including retraining personnel."

Concerning the Climate Justice Corp

- The Climate Justice Corps Board should include 3 Representatives of the communities the program is trying to work in (page 26)
- On page 27 line 16-17 it should be stated that the meetings should rotate and be hosted within the communities the Corp Program aims at benefiting.

Appropriations and timeline

- Increase appropriations to the Climate Catalytic Capital Fund to $10 million a year and extend through FY2028
- For net-zero schools (pg. 9-10), Increase individual grants to a ceiling of $5 million, extend the program until 2034, and increase the annual appropriation to $20 million.
- Consider appropriations to MDE's air department to support the landfill methane work outlined on page 12
- Climate Transition and Clean Energy Hub should have an annual appropriation of $1.5 million to fund the hub (pg. 45)

Amendments focused on mitigation potential impact on tenants

Additionally, the Sierra Club supports amendments, laid out below, offered by the National Housing Trust, which

- Pg, 47 under "Regulations adopted under this section shall:" add "Allow owners of covered buildings to submit an Alternative Compliance Action Plan to the Department if the building owner cannot meet the interim or final emissions standards by the required date or cannot meet the interim or final emissions standards due to economic infeasibility or other circumstances beyond the owner's control. The Plan shall include: (a) documentation of economic infeasibility or other circumstances beyond the owner's control such that the interim or final emissions standards cannot be met; (b) if applicable, new proposed interim or final emissions standard; (c) a list of actions the owner will take to achieve the proposed interim or final emissions standard; (d) the timeline for achieving the proposed interim or final emissions standard; and (e) other requirements determined by the Department. The criteria for evaluating an Alternative Compliance Action Plan submitted by owners of affordable housing shall include, at a minimum, whether: (a) there is a plan to refinance/recapitalize their property; or (b)there are cash flow constraints, including, but not limited to, restrictions on the usage of net cash flow, or prohibition from utilizing a portion of existing cash reserves for implementing improvements to the building that would reduce emissions."
    - *Purpose of amendment: Provides flexibility for building owners that face significant challenges to meeting compliance. Allows building owners to propose revised emissions standards and/or an adjusted timeline for meeting the emissions standard. Assures accountability by specifying the requirements that owners must meet when applying for an alternative compliance pathway and authorizing the administering agency to approve*

or deny the owner's proposed plan. Also, specifies financial barriers related to affordable housing that the department must consider when evaluating a proposed alternative compliance action plan.

- Pg. 50, add to the Building Energy Transition Implementation Task Force: "One representative who is a tenant of an apartment building or is an advocate for the rights of tenants of apartment buildings
    - *Purpose of amendment: Adds an important perspective to the Task Force to ensure that programs and policies address the needs of tenants.*
- Pg, 51, under "The Task Force Shall" add "Study the costs of complying with building emissions standards for different building types including, but not limited to, affordable housing."
    - *Purpose of amendment: Such a study is required to identify funding gaps and inform the development of complementary policies and programs*
- Pg. 51, under the "Task Force Shall" add "Study and make recommendations regarding the development of complementary programs and policies that protect renters from increased rents and energy burdens and risk of displacement."
    - *Purpose of amendment: Helps ensure that programs and policies will be in place to protect tenants from unintended consequences that perpetuate existing inequities.*
- Pg. 51, line 12, under the "Task Force Shall" add at the end of the sentence "that shall prioritize recommendations for funding the retrofit of affordable housing."
    - *Purpose of amendment: Identifies funding for affordable housing as a priority of the Task Force.*
- The Task Force should also be involved in advising the development of regulations. Proposed language: "The Task Force shall: Advise the Department on creation of an implementation plan for the Emissions Standards Program; Recommend amendments to proposed regulations issued by the Department"
    - *Purpose of amendment: Ensures that key stakeholder perspectives are consulted as the regulations and implementation plan for the building emissions standard are developed. Similar to what was required of the Task Force in DC.*

SB 528_CBF SUPPORT WITH AMENDMENTS.pdf
Uploaded by: Joshua Kurtz
Position: FWA

CHESAPEAKE BAY FOUNDATION

Environmental Protection and Restoration
Environmental Education

Senate Bill 528
Climate Solutions Now Act of 2022

Date: February 15, 2022
To: Education, Health and Environmental Affairs

Position: **Support with Amendments**
From: Josh Kurtz, MD Executive Director

Chesapeake Bay Foundation (CBF) **SUPPORTS SB 528 WITH AMENDMENTS**. This legislation updates the state's goals for greenhouse gas emissions reductions and requires state agencies to incorporate climate impacts into their long-term planning. It strives to address environmental justice in communities most impacted by climate change and creates a working group to foster a just transition for Marylanders whose jobs are threatened by the transition to a climate-friendly economy. The bill seeks to reduces emissions from the building sector through requirements for new construction and building emission standards. It requires additional gains for energy efficiency through EmPOWER and fosters innovation through the Clean Energy Fund. It demands leadership from the state by reducing government building emissions and converting the state's vehicle fleet to electric.

Additional amendments from a partnership of environmental stakeholders advance strengthening and technical changes. With these amendments, SB 528 will reduce emissions from the largest sources across the state while balancing economic impacts to residents and businesses.

Tackling Climate Change is Critical for Chesapeake Bay Recovery
Climate change has immediate and drastic impacts on the Chesapeake Bay, many of which are already being witnessed. Warmer climates translate into warmer waters, which decrease dissolved oxygen, exacerbating the Bay's fish-killing "dead zones" and contributing to algal blooms. Rising water temperatures stress fish and reducing the populations from the Bay's iconic striped bass to brook trout. Other temperature-sensitive species such as eel grass, a critical habitat plant, are at risk.

Atmospheric deposition of nitrogen is the highest nitrogen input load in the Chesapeake Bay. Nitrogen pollution feeds algal blooms that block sunlight to underwater grasses and suck up life supporting oxygen when they die and decompose. The principal source of oxidized nitrogen, also called NOx, is produced by machines or processes that are powered by gas, coal or oil, like the heating of a building[1].

The legislation aligns long-term emissions reductions targets with international guidance and the Maryland Commission on Climate Change's recommendations.
The long-term goal of reaching net zero by 2045 is widely regarded as critical for keeping global warming below 1.5 C and preventing the worst impacts of climate change.[2] The Intergovernmental Panel on Climate

[1] Chesapeake Bay Program, *Air Pollution: What airborne pollutants are affecting Bay health?*
[2] IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.). *World Meteorological Organization, Geneva, Switzerland, 32 pp.*

Change including this goal in its report in response to the Decision of the 21st Conference of Parties of the United Nations Framework Convention on Climate Change to adopt the Paris Agreement.

The Maryland Commission on Climate Change recommended the same goal of net zero emissions by 2045 after evaluating the Sate's capacity to meet the goal, and in consideration of the economic impacts of action.[3] As described in the Commission's report, "The Commission's working groups heard from experts on topics, including decarbonizing the buildings sector, the power sector, and the transportation sector; the impact of climate change on coastal construction, labor and manufacturing, and the agricultural community; natural solutions to climate change, including carbon sequestration from forests and healthier soils; new targets for solar development and the offshore wind supply chain; emerging technologies; energy efficiency in homes and at businesses; and long and short-term climate resiliency and coastal hazard mitigation."[4]

This legislation sets Maryland's government as a leader in action to mitigate climate change by targeting the largest sources of emissions.
SB 528 not only provides a goal supported by science, but several actionable interventions that target the three largest sources of emissions – the buildings sector, the power sector, and the transportation sector. These three sectors account for over 85% of Maryland's emissions. This legislation directs each state agency to take into account the impacts of agency decisions relating to the 2045 net zero goal when conducting long-term planning, developing policy, and drafting regulations.

Climate change impacts are felt across our entire economy, costing the state $10B-$20B since 1981.[5] Requiring each state agency to evaluate their impacts will provide opportunities to implement the many fine-scale solutions that will be key to meeting the 2045 net zero goal. This approach also harnesses the subject-matter expertise of each department to reducing emissions in their sector. The State's path to emissions reductions will shed light on the most-effective ways to mitigate carbon pollution from all sectors. The State can leverage its purchase power to reduce overall costs to consumers through broad investments in new technologies, such as installation of infrastructure needed to support the adoption of electric vehicles.

Requiring all newly constructed buildings to heating and water demands without fossil fuels will not only reduce fossil fuel use but also reduce costs to Maryland residents.
Direct use of fossil fuels, primarily for space and water heating, account for 13% of statewide greenhouse gas emissions since 2017.[6] By requiring all newly constructed buildings to use electric heat pumps we will drastically reduce those greenhouse gas emissions. The costs associated with new construction of electrified homes is cheaper than homes constructed with gas or other fossil fuel heating systems[7]. The annual costs of maintaining electric heat pumps are also cheaper or comparable depending on the system. This transition will save Maryland homeowners and renters money each year.

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[3] Maryland Commission on Climate Change. *2021 Annual Report and Building Energy Transition Plan*.
[4] *Id.*
[5] *Id.*
[6] Maryland Commission on Climate Change. *Building Energy Transition Plan: A Roadmap for Decarbonzing the Residential and Commercial Buildings Sectors in Maryland*, November 2021.
[7] *Id.*

SB 528 works to center those living in areas most at-risk for climate change impacts and those workers whose livelihood may be affected by the transition to a net-zero future.
The bill establishes the Climate Catalytic Capital Fund that is administered by the well-respected Maryland Clean Energy Center. The fund will provide opportunities to access federal, state and private investment to support projects in overburdened communities. Projects that increase weatherization and implement electrification strategies will not only reduce GHGs but also costs for those communities for their energy bills. With a move to more electric buildings and transportation fleet the job market will evolve from traditional technologies. This bill establishes the Just Transition Employment and Retraining Work Group which would focus on assisting those displaced by the shift to find jobs in the new economy. The Work Group a diverse stakeholder group to determine a set of recommendations to reduce the impact to those workers.

CBF urges the Committee's FAVORABLE report on SB 528. For more information, please contact Robin Jessica Clark, Maryland Staff Attorney, at rclark@cbf.org and 443.995.8753

SB528_ FWA - Favorable with Amendments.pdf
Uploaded by: Kim Coble
Position: FWA

MARYLAND LEAGUE OF CONSERVATION VOTERS

February 15, 2022

SUPPORT WITH AMENDMENTS: SB528 - Climate Solutions Now Act

Chairman Pinsky, Chairman Guzzone and Members of the Committees

Maryland LCV strongly supports SB528 - Climate Solutions Now Act, and we thank Senator Pinsky for his leadership on this issue. We are grateful for the robust, ambitious policies to make substantive reductions to our state greenhouse gas emissions.

SB 528 provides critical elements that will help Maryland achieve its greenhouse gas emissions including, creating a commitment to net-zero emissions by 2045, transitioning the state fleet to electric, ensuring new buildings achieve net-zero emissions by 2040. Additionally, the bill incorporates some key elements to address environmental injustice related to climate change. We support these provisions as well as the creation of the Climate Catalytic Capital Fund, the Just Transition working group and the Climate Transition and Clean Energy Hub.

We also suggest the following amendments to improve the bill and further address climate justice in Maryland:

- Under Environment Article beginning 1-702 that addresses the identification of and direction of resources to environmental justice communities, Maryland LCV urges that the Senate make the following changes to conform the legislation to efforts being advanced by advocates working with environmental justice community experts.
    1. Include language specifying that **40 percent of the overall benefits from specific federal investments** (i.e. energy efficiency, clean energy, clean water infrastructure, and training and workforce development), as well as in the proposed Climate Catalytic Capital Fund, must be directed to overburdened communities.
    2. Include language requiring all state agencies in Maryland to conduct a baseline assessment of the environmental, climate, equity, and labor impacts associated with any state action. The bill should also include language requiring an additional assessment for any state action that will have an impact on underserved communities. This assessment includes how a state action may impact an underserved community in terms of:
        a. potential deterioration of public health,
        b. potential increase of pollution and associated environmental health burdens, and
        c. potential negative impacts on economic well being or residents. IF a state agency determines that an action will have a negative impact on an underserved community, the Climate Equity Act directs each state agency to:

i. conduct a mitigation analysis of the measures taken by the agency to substantially decrease or eliminate the negative impacts,
ii. assess opportunities to "direct proceeds, benefits, or investments" which may result from the action in such a manner that will benefit the underserved community, and
iii. engage in meaningful communication with the public regarding the negative impact(s) and mitigation strategies.

3. Climate Solutions Now should include the following definitions of minimum Criteria:
    a. **"Underserved Community"** shall be at minimum, an underserved community that includes any census tract, as determined in accordance with the most recent United State Census, in which:
        i. At least 25% of the residents qualify as low-income; or
        ii. At least 50% of the residents identify as non-white; or
        iii. At least 20% of the residents have limited English proficiency; or
        iv. An area or a neighborhood designated by the Secretary of the Environment as an underserved community in accordance with the petition language described below'
    b. **"Low-Income"** shall be defined as a resident in a household that is at or below 200% of the federal poverty guidelines
    c. "**Overburdened Community"** at a minimum shall be defined as any community that includes any census tract for which three or more of the below indicators are above the 75th percentile statewide:[1]
        i. Particulate Matter 2.5
        ii. Ozone
        iii. NATA diesel PM
        iv. NATA Air Toxics Cancer Risks
        v. NATA Respiratory Hazard Index
        vi. Traffic Proximity and Volume
        vii. Lead paint indicator
        viii. Superfund proximity/Proximity to National Proximity List Sites
        ix. Proximity to Risk management plan facilities
        x. Proximity to Treatment and Disposal Facilities
        xi. Proximity to Major Direct Water Discharges
        xii. Proximity to a confined animal feeding operation (CAFO)
        xiii. Percent wifi
        xiv. Asthma Emergency Room Discharge
        xv. Myocardial Infarction Discharges
        xvi. Low Birth Weight Infants
    d. **"Environmental Justice Community**" shall be defined as communities that are both underserved and overburdened.
4. Petition Parameters:

[1] The environmental justice advocates are still refining the definition of 'overburdened.' Maryland LCV looks forward to working with the Committees to ensure that once that definition has been finalized, it is incorporated into SB538 and other similar legislation.

a. Subject to subsection (b) of this section and on petition of at least ten residents of an area or a neighborhood located of an area or a neighborhood located within a census tract that does not meet the criteria specified [in the definition of underserved community or overburdened community, the Secretary of the Environment may designate the area or neighborhood as an underserved community or overburdened community if the Secretary determines that the area or neighborhood otherwise qualifies as an underserved or overburdened community.
b. The Secretary of the Environment may deny a petition submitted under subsection (a) of this section if the Secretary determines that the area or neighborhood that is the subject of the petition;
    i. has an annual median household income that exceeds 125% of the statewide median household income;
    ii. has a majority of individuals at least 25 years old that have a college education
    iii. Does not bear an unfair burden of environmental pollution; and
    iv. Has more than limited access to natural resources including open spaces, water resources, and playgrounds

- **Climate Catalytic Capital Fund:** we urge an increase in the amount of funds allocated to this initiative in order to ensure that it is sufficient to make a substantive contribution to the programs funded by the statewide green banks. Additionally, in this article, we ask that other statewide green banks be eligible for receiving these funds, especially as they support funding projects that serve low and moderate income communities. Most importantly, we strongly urge that this program follow the provisions of Justice 40 and require 40% of the Climate Catalytic Capital Fund investments be directed to overburdened communities as identified above.

- **Climate Justice Corps:** We encourage the Senate to adopt the worker rights, pay, and benefit proposed for the Maryland Corps by SB228, as well as amendments proposed by our partners at Sunrise Baltimore which urge organizing rights and hiring prioritization for youth, low-income, and other historically marginalized groups.

- **LMI Community Solar Tax Exemptions:** This provision, as well as the stand-alone bill that supports community solar projects on developed lands that serve Low and Moderate Income households, is a top priority for Maryland LCV. We urge the Senate to keep these provisions as a statewide mandate across counties. We support the amendment promoted by our partners from Anne Arundel County, however, which allows counties to take these mandated provisions further, and provide a property tax exemption for any community solar projects, especially those built on already developed land, serving LMI households.

We are grateful for the leadership and vision presented by Chairman Pinsky in the Climate Solutions Now Act. We respectfully offer and strongly advocate for the inclusion of these clarifying and strengthening amendments and Maryland LCV strongly urges a favorable report on this important bill.

SB528-Climate Solutions Now-EHEA-TPMEC-favwamend.p
Uploaded by: Laurie McGilvray
Position: FWA

TAKOMA PARK MOBILIZATION

Environment Committee

Committee: Education, Health and Environmental Affairs
Testimony on: SB528 – Climate Solutions Now Act of 2022
Organization: Takoma Park Mobilization Environment Committee
Submitting: Laurie McGilvray, Co-Chair
Position: Favorable with Amendments
Hearing Date: February 15, 2022

Dear Mr. Chairman and Committee Members:

We are pleased to submit testimony on SB528 – Climate Solutions Now Act of 2022. The Takoma Park Mobilization Environment Committee is a grassroots organization focused on State and County climate action. We have been very involved in Montgomery County's climate action planning and proposed legislation on building energy performance standards. We believe SB528 will provide significant, complementary tools to help the County and the State achieve their climate goals.

Thank you for bringing this comprehensive climate legislation that supports our priorities of **Emission Reduction, Electrification, Efficiency,** and **Environmental Justice** - the **four Es** of a climate solution.

We strongly support:

- **Emission Reduction** goal of 60% by 2030 and net zero by 2045;
- **Electrifying** new buildings (including schools), school buses, and light duty trucks, because getting off fossil fuels is an essential step in lowering climate pollution and improving our health;
- **Efficiency** through building performance standards that put buildings on an "energy diet;"
- **Environmental Justice**-focused investment in black and brown communities who aspire to live in healthy, clean neighborhoods, but for whom Maryland has underinvested in and concentrated polluting facilities in their communities.

We believe the bill can be further strengthened by the following amendments.

1. **Building Emission Performance Standards** - While the bill currently includes the measurement, reporting, and requirements for **direct emissions** (*defined as "onsite fuel combustion, e.g., gas used onsite for water and/or space heating, cooking, and refrigerant leaks"*), it should be amended to include performance measures for **improved energy efficiency** (e.g., site electricity use), such as: maintaining and retro-commissioning building energy systems; implementing HVAC scheduling and other smart control systems; and making building shell and other energy efficiency improvements, as recommended by the

MD Commission on Climate Change's Building Energy Transition Plan. Improved building energy efficiency will reduce overall electricity demand, thereby reducing greenhouse gas emissions by decreasing buildings' demand on the grid. Greater building efficiency also can result in smaller-sized, less costly heating and cooling systems.

In addition, the bill should be amended to ensure affordable housing can comply with the performance standards and protect renters, by including: 1) flexible timelines for designated affordable housing to to align with recapitalization and refinancing schedules, 2) a clear definition of "Designated Affordable Housing," and 3) policies to protect renters from increased rents and energy burdens in naturally occurring affordable housing. The bill should be amended to provide easily accessible funding, technical assistance, and an alternative compliance pathway to help affordable housing owners comply with the regulations (see National Housing Trust testimony).

2. **Electrifying All New Schools** – Children and teachers deserve healthy, comfortable learning environments. New schools should be built for the future and treated similarly to other public buildings. The experience of Maryland's three net zero schools has shown that they can be constructed for the same cost as conventional schools. Maryland should invest its limited school construction dollars in climate-friendly net zero buildings that are healthy for students and teachers and which cost no more to construct and less to operate over the lifetime of the building. The bill should be amended to require new schools to be net zero.

3. **Environmental Justice** – We are very supportive of the Climate Justice Corps which is intended to create career training opportunities in the new green economy, particularly for youth from disadvantaged communities. We would like to see this provision strengthened by amending it to also provide good pay, health benefits, and career training to Climate Justice Corps participants.

We have attached a detailed list of amendments and recommend a **FAVORABLE WITH AMENDMENTS** report in committee.

Amendments to SB528 coordinated by the Maryland Climate Partners

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protections against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e., prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)
- **Under 12-1602 (C) of the Public Safety Code, add: Energy Conservation**

    Insert:

    For new covered buildings funded at least 25% by State funds

    A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023.

    A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.

    For all other new covered buildings.

A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2027.

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language (attached).
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools/Net-Zero Ready Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report the status of meeting the high performance building requirements.
- P. 8, line 9-13:
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article OR
- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

Technical Amendments

- The term "Disproportionately affected communities" should be replaced with "overburdened communities."
    - The definition of communities that are overburdened needs to include factors beyond climate change indicators.
        - At a minimum, an overburdened community includes any census block group… in which: (1) at least 45 percent of the households qualify as low-income households (defined as a household that is "at or below 200 percent of the federal poverty guidelines"), (2) at least 50 percent of the residents identify as non-white; OR (3) at least 25 percent of the households have limited English proficiency
- Specific to the establishment of goals for the percentage of state funding for GHG emissions reduction measures (page 10 lines 21-24 and page 11 lines 8-11):
    - Explicitly define GHG emissions reduction measures broadly (e.g.: Does it include adaptation measures such as tree planting? Building improvements? etc.)

Schools

- Delete "subject to the availability of funding" on page 8 line 14
- Fund Oversight committee of the Climate Catalytic Capital Fund should include representatives from overburdened communities and affordable housing communities.

On landfill methane

- subsection 2-408 (page 12), Amend the deadline for adoption of regulations January 2023 or June 2023.

State Fleet Electrification

- On page 42, in line 14, delete "subject to the availability of funding"

Climate Transition and Clean Energy Hub

- Include requirements for a user-friendly website and dashboard for keeping track of the hub's progress and findings. (pg. 45)

Building Performance Standards

- Designated Affordable housing needs flexible timeline to align with their scheduled recapitalization and refinancing timelines
- Include a representative of the low income, renter, tenants housing community, and an ESCO rep on the Building Energy Transition Implementation Task Force (page 49)
- Edit language for the Building Energy Transition Task Force charge in section (F) (1) to include reduction of direct emissions from the building sector (pg. 51)
- Edit language for the Building Energy Transition Task Force charge in section (F) (2) to ensure the Plan may include recommendations related to aligning and maximizing federal health, safety, weatherization, energy affordability, and electrification resources and programs, and education programs for contractors and installation technicians focused on building electrification solutions (pg. 51)

- Enabling provisions should be added to allow local jurisdictions to establish more stringent energy efficiency and conservation standards for both major renovations and new construction.
    - Major renovations: include requirement for 40% reduction in covered building's energy use (or 20% reduction beyond current energy code) for major renovations. Suggested bill language for this, and definition of major renovations, in this doc.

Regarding Just Transition Employment Working Group

- Membership of the working group, on pg. 18, lines 5-6 strike "one representative of the Maryland Chapter of the Siera club, selected by the Maryland Chapter of the Sierra Club" and replace with "Two representatives of the environmental community"
- On page 20, line 7, strike "counter" and substitute "address".
- Fenceline communities should be defined (page 20, line 16)

Regarding school bus electrification

- When referring to the "cost difference between purchasing and operating" on Page 22 line 26, clarify that this includes "purchasing, deploying (infrastructure), administrative and operating costs, including retraining personnel."

Concerning the Climate Justice Corp

- The Climate Justice Corps Board should include 3 Representatives of the communities the program is trying to work in (page 26)
- On page 27 line 16-17 it should be stated that the meetings should rotate and be hosted within the communities the Corp Program aims at benefiting.

<u>Appropriations and timeline</u>

- Increase appropriations to the Climate Catalytic Capital Fund to $10 million a year and extend through FY2028
- For net-zero schools (pg. 9-10), Increase individual grants to a ceiling of $5 million, extend the program until 2034, and increase the annual appropriation to $20 million.
- Consider appropriations to MDE's air department to support the landfill methane work outlined on page 12
- Climate Transition and Clean Energy Hub should have an annual appropriation of $1.5 million to fund the hub (pg. 45)

<u>Aligning CSNA with complementary bills</u>

EMPOWER:

Whether in SB528 (pg. 36-37) or in complementary legislation, we support making revisions to the EMPOWER program to better align with our climate goals and energy needs. We are agnostic to the legislative vehicle for these changes but acknowledge the urgency due to the 2023 sunset of EMPOWER without legislative action. Reform should include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions
- Modifying Empower to focus on electrification and prohibit use of Empower support for new fossil fuel. (simply copy HB708, pg 24, lines 5-20)
    - "Article – Public Utilities 5 7–211. 6 (d) (1) Subject TO PARAGRAPH (2) OF THIS SUBSECTION AND SUBJECT to 7 review and approval by the Commission, each gas company and electric company shall 8 develop and implement programs and services to encourage and promote the efficient use 9 and conservation of energy by consumers, gas companies, and electric companies. 10 (2) BEGINNING WITH THE CALENDAR YEAR 2024, THE PROGRAMS 11 AND SERVICES PROVIDED UNDER THIS SUBSECTION SHALL: 12 (I) ENCOURAGE AND PROMOTE THE REPLACEMENT OR 13 ENHANCEMENT OF GAS, OIL, OR PROPANE HEATING SYSTEMS WITH ELECTRIC HEAT 14 PUMPS, GIVING PRIORITY TO LOW–INCOME HOUSEHOLDS AND CONSUMERS; AND 15 (II) ENCOURAGE AND PROMOTE BENEFICIAL ELECTRIFICATION 16 FOR THE PURPOSES OF REDUCING ENERGY CONSUMPTION, REDUCING CONSUMER 17 COSTS, AND REDUCING GREENHOUSE GAS EMISSIONS. 18 (3) BEGINNING WITH THE CALENDAR YEAR 2024, THE PROGRAMS 19 AND SERVICES PROVIDED UNDER THIS SUBSECTION MAY NOT PROVIDE FINANCIAL 20 ASSISTANCE FOR EQUIPMENT OR APPLIANCES THAT USE FOSSIL FUEL.
- Modify acceptable use of SEIF.
    - See page HB708, pg 27, which modifies Public Utility Article 9–20B–05. The bill makes all SEIF funding subject to the following provisions (pg 29)
        - *11 (F–5) FUNDING PROVIDED UNDER SUBSECTION (F) OF THIS SECTION MAY BE 12 USED FOR A PROJECT THAT USES FOSSIL FUEL ONLY IF IT CAN BE DEMONSTRATED 13 THAT THE LIFECYCLE GREENHOUSE GAS EMISSIONS FOR THE PROJECT ARE LESS 14 THAN AN ALL–ELECTRIC ALTERNATIVE."*

Climate Justice Corps:

Climate Solutions Now and Comprehensive Climate Solutions have excellent criteria for climate mitigation and climate justice projects to build the decade of the Green New Deal, but they do not guarantee good pay and wages - which would exclude folks who need the jobs the most, black and brown and working class communities. The other proposal, Maryland Corps' Climate Corps program, funds good paying jobs with good benefits, but funds parks staffing shortages instead of climate mitigation and climate justice. Neither of these policy measure up to what the climate crisis and economic and racial justice demand.

To ensure that SB528 and SB228 work together and meet the needs of the environmental justice movement, we request that Senator Pinsky and President Ferguson align their bills to create a program (in either vehicle) that promotes climate projects with well paid/benefitted jobs. (Suggested amendment language below).

Unanswered questions

- Page 21, line 16-28, Should the IAC be added to be required to report annually in addition to state agencies?

Potential Amendment Language

On schools:

- SB 528 Page 38, line 10-18, adds an "AND" to the definition of "High Performance" which requires all State-funded projects to be zero energy. And Page 8, line 9-18, excludes schools from this requirement (except for 1 school to be zero energy in each district by 2033.) There are 2 possible paths for suggested amendments and this is probably best with a conversation.
    - One suggestion to simplify would be to remove both of these sections, and require energy efficiency targets as noted above for all State buildings, and all buildings with 25% funding on a path to zero energy ready.
    - If Zero Energy stays in the High Performance definition section requiring state buildings to be zero energy now, then the energy efficiency targets as noted above could be revised to be for Public Schools and Community Colleges.

On Climate Justice Corps:

- Replace stipend criteria in CSNA with the more robust benefits guaranteed to corps members such **$15/hr** ***minimum wage, health insurance, wraparound services & education support*** **$6000 education bonus exactly as they appear in MD Corps (SB228)**.
- Remove pg 29 line 25 - 29
- Replace in whatever format is legally or procedurally preferably so that the overseeing Board adopt regulations conforming to provisions from Maryland Corps (SB228) 24-1105 (B) sections 3 - 10
    - (3) PRIORITIZING THE PLACEMENT OF PROGRAM PARTICIPANTS WITH LARGE–SCALE EMPLOYERS BASED ON THE ORGANIZATION'S DEMONSTRATED NEED FOR PROGRAM PARTICIPANTS WHO WILL TRANSITION TO FULL–TIME EMPLOYMENT FOLLOWING COMPLETION OF THE PROGRAM;
    - (4) A CENTRALIZED PROCESS TO FACILITATE EFFICIENT SCREENING AND PLACEMENT OF PROGRAM PARTICIPANTS AS WELL AS EFFECTIVE MEASUREMENT AND EVALUATION OF THE PARTICIPANT'S SERVICE EXPERIENCE;
    - (5) STIPENDS FOR PARTICIPANTS, INCLUDING:
      (I) MONETARY PAYMENT OF AT LEAST $15 PER HOUR, HEALTH INSURANCE BENEFITS, AND THE POTENTIAL FOR WRAPAROUND SERVICES; AND
      (II) FUNDS MATCHING REQUIREMENTS FOR LARGE–SCALE EMPLOYERS;
    - (6) AN EDUCATION AWARD OF $6,000 FOR PARTICIPANTS THAT COMPLETE AT LEAST 9 MONTHS OF SERVICE, WHICH SHALL BE DEPOSITED INTO A TAX–EXEMPT MARYLAND 529 ACCOUNT ESTABLISHED UNDER TITLE 18, SUBTITLE

19 OF THIS ARTICLE AND MAY ONLY BE USED FOR QUALIFIED HIGHER EDUCATION EXPENSES, AS DEFINED IN § 18–1901 OF THIS ARTICLE;

- (7) WORKFORCE DEVELOPMENT TRAINING AND WRAPAROUND SERVICES PROVIDED TO PROGRAM PARTICIPANTS BY PARTICIPATING ORGANIZATIONS;
- (8) ADDITIONAL TRAINING AND SUPPORT SERVICES PROVIDED TO PROGRAM PARTICIPANTS AFTER THE COMPLETION OF THE PARTICIPANT'S SERVICE;
- (9) ONGOING EVALUATION OF OPPORTUNITIES TO EXPAND SERVICE IN THE STATE TO ADDRESS THE STATE'S WORKFORCE DEVELOPMENT NEEDS, INCLUDING OPPORTUNITIES WITHIN STATE AGENCIES FOR THE CREATION AND EXPANSION OF SERVICE OPPORTUNITIES WITHIN THE AGENCIES; AND
- (10) ONGOING EVALUATION OF THE PROGRAM TO ENSURE ACCESS AND EFFECTIVENESS, INCLUDING:
  (I) DEMOGRAPHICS OF CORPS PARTICIPANTS, INCLUDING RACE, ETHNICITY, AGE, EDUCATION, AND GEOGRAPHY; AND
  (II) POST–PROGRAM TRAJECTORIES OF CORPS PARTICIPANTS

- Corps members should have the right to organize for collective bargaining and the right to strike, and should be protected from being discharged, disciplined, or permanently replaced for striking.
- Consider removing the age range of corps members and prioritizing applicants under 35 years old.

Climate Solutions Now - FAVORABLE.pdf
Uploaded by: Lee McNair
Position: FWA

Cedar Lane Unitarian Universalist Environmental Justice Ministry

HB 583 Climate Solutions Now

Environmental and Transportation Committee

3/27/2021

FAVORABLE

As a people of faith, we believe this is a vital bill. We would be very disappointed if this bill should be weakened by attaching amendments that change any aspects of the bill as written.

The Maryland Commission on Climate Change recommends that Maryland achieve net neutrality by 2045
The bill will also require a 60% reduction in greenhouse gas emissions below 2006 levels by 2030

Current law requires the state to reduce greenhouse gas emissions 40% by 2030 and sets an aspirational goal of 80% by 2050

The Commission on Environmental Justice and Sustainable Communities will decide what percent of all state funds invested in climate must be spent in overburdened communities This provision is based on the New York Climate and Community Investment Act, which is widely considered the gold standard of state environmental justice policies

A work group comprised of IBEW, AFL-CIO, registered apprenticeships, construction laborers, and building trades will be formed
This work group will make recommendations for workforce development and training for displaced fossil fuel workers.

Plant 5 million trees by 2030 with 10% (500,000) to be planted in underserved urban areas of the State
Increase EMPOWER efficiency gains from 2% to 3% a year
Fund bus and passenger vehicle electrification

Require air monitoring at landfills
Require emission reductions from retrofitted large buildings
Require new state buildings to be net neutral, with exceptions for schools

Let's pass Climate Solutions and protect our children.

We ask that you pass HB0583 as favorable without amendments.

Thank you, Lee McNair, co-chair

Cedar Lane UU Environmental Justice Ministry

SB528 Proposed Amendments.pdf
Uploaded by: Lee McNair
Position: FWA

Priority Amendments

Building electrification and efficiency:Â

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.Â
    - The purpose of the funds should explicitly include â€œFacilitate the electrification of the building sectorâ€.
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuelsÂ
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.

- On page 35, lines 2-3, strike â€œwater and space heatingâ€ and substitute â€œon-site energyâ€ and add on line 3, â€œexcept for kitchen appliancesâ€.

- Insert on Page 35, following line 6

(12-501(3)(I)(2)(A (under the provision requiring solar ready):

1. The Installation of Solar Energy Systems

- To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:Â

- Will have 20,000 square feet or more of continuous roof space, excluding the parking area; andÂ

- Will be 20 stories or less in height, above grade plane.Â

2. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solarâ€“ready requirement for a building on a specific finding that:Â

- incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; orÂ

- shadow studies indicate that 25% of a buildingâ€™s roof area will be in shadow.Â

- On page 35, following line 9, add energy efficiency provisions for buildings. Add:

D. For new covered buildings funded at least 25% by State funds

- A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

E. For all other new covered buildings

- A 40% reduction in modeled energy use consumption over the 2018

International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS â€“ Energy Conservation

F.Â â€œMajor Renovationâ€ means a renovation project:Â

- For which the total projected cost exceeds 50% of the assessed value of the existing building; orÂ

- Involving a change of use, if the change involves the application of different requirements of the standards.Â

G.Â Except as provided in subsection (_) of this section, if aÂ covered building is undergoing a major renovation, the building shall be renovated to achieve:Â

- A 40% reduction in the buildingâ€™s average annual energy use; orÂ

- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25â€“year period for all buildings funded at least 25% by the State.Â

- A 15â€“year period for all other buildings. Â

- Provisions regarding â€œalternative compliance pathwayâ€ on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030

- Pages 47, delete lines 18-19 (â€œPROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDSâ€)

- The Building Emission Performance Standards regulations directive under 2-1602 (C) shouldÂ

    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,

    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildingsâ€™ retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.Â

    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15

as well

- The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planningÂ

Net Zero SchoolsÂ

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.

- School buildings that are not net-zero energy should be net-zero energy ready.

- Delete â€œsubject to the availability of fundingâ€ on Page 8 Line 14 and replace that language with one of the options below -Â

- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. â€œExcept as Provided in . .

  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a â€˜high performance buildingâ€ under Â§ 3-602.1 12 of the state finance and procurement article Â OR
  Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40%

reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.Â

- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.Â

- Pg 8, line 25 â€“ pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.Â

Buy Clean Maryland ActÂ

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.

    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~

    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

Climate 2022 Testimony SB 528_Ferretto 22_0215.pdf
Uploaded by: Lisa Ferretto
Position: FWA

LISA M. FERRETTO, AIA, LEED AP BD+C, WELL AP, Eco-Districts AP, GGP

February 14, 2022

Senator Pinsky
Chair of the Education, Health, and Environmental Affairs Committee

Re: SB 528, Climate Solutions Now Act of 2022
Position: Favorable with amendments as suggested by the Climate Partners Group

Dear Senator Pinsky and members of the EHEA Committee,

Thank you for the opportunity to provide testimony in support of Senate Bill 528, the Climate Solutions Now Act of 2022. I am currently a Sustainability Director and Architect and am a member of both the AIA, American Institute of Architects, as well as USGBC, the U.S. Green Building Council. I am also a representative on the AIA Large Firm Sustainable roundtable collaborating with other large architecture firms across the country to lead the way to carbon neutrality. I have served as a member of the MD Green Building Council (MDGBC) for three years and am currently serving as a Commissioner for Baltimore City's Commission on Sustainability.

The Climate Solutions Now Act ensures that Maryland is a partner and a leader in Sustainability. It acknowledges the interconnected issues and strategies involved in undertaking climate change - buildings, transportation, waste, and most importantly, the people. The bill amends Maryland's greenhouse gas (GHG) emissions goal to a 60% reduction by 2030 and a net zero emissions by 2045. Locally, these targets directly align with the goals Mayor Scott announced in January for the City of Baltimore, and globally, it works towards the Paris Climate Agreement targets and those set by Architecture 2030 and adopted by the AIA.

Any path to carbon neutrality and goal of reaching zero greenhouse gas emissions will need to include a move away from fossil fuels. "Direct fuel use in … buildings accounted for 18% of Maryland's … greenhouse gas emissions" (MDE, 2017). We also need to address total energy use - where buildings account for **39%** of Maryland's total energy consumption (EIA, 2019). This is the same percentage reported as GHG emissions by sector in Maryland's Greenhouse Gas Emission Inventory (MDE, 2017). The EPA also states that Carbon Dioxide makes up about 80% of the total US GHG emissions, (EPA, 2019). And when we zoom into an urban area like Baltimore, building's account for about 70% of the total carbon dioxide emissions in the City.

Reducing emissions in buildings is a critical component to reducing overall GHG emissions in the State, and to be successful, we also need to require that buildings being constructed now are energy efficient. I understand there may be amendments proposed to the bill to include energy conservation targets for new construction and major renovations. The modeled energy savings in new buildings will be greenhouse gas emission savings in the future. Energy efficiency measures also help to reduce operating costs and we know the cost of construction and inflation is a huge topic in the industry today. I also fully support the inclusion of programs that incentivize efficiency and work to alleviate energy burden. The median energy burden of low-income households in Baltimore is over 3 times higher than non-low-income households.

The Climate Solutions Now Act also includes "Building Performance Standards" - provisions for reducing emissions from existing buildings. This is also an important piece of comprehensive climate legislation to ensure that our existing building stock is on target to reduce energy consumption by the State's overall target goal and year. Building Performance Standards though cannot happen without Benchmarking. We cannot

get to where we want to go (zero emissions by 2045) without knowing where we are. Benchmarking sets the baseline and creates the path. It is about transparency and accountability and overall it increases awareness of energy efficiency.

The Climate Solutions Now Act also recognizes the crucial link with social environment and communities. The bill includes provisions for a Climate Catalytic capital fund, a Maryland Green Bond Program, a Just Transition Employment and retraining working group, a MD Climate Justice Corps, a zero-energy school grant fund, a Climate Transition and Clean Energy Hub and a Building Energy Transition Implementation Task Force.

As a sustainability architect and advocate – I am excited about SB 528, the Climate Solutions Now Act, and the positive impact this bill will have. It ensures that Maryland is doing its part to meet the climate targets needed; holds the State accountable; and protects our State's finances, the natural environment, and most importantly, the people.

I look forward to the favorable passing of this bill as *Now* is the time to *Act* on *Climate Solutions*.

Sincerely;

Lisa M. Ferretto, AIA, LEED AP BD+C, WELL AP, Eco-Districts AP, GGP

Climate Access Fund CSN testimony 02_15_2022.pdf
Uploaded by: Lynn Heller
Position: FWA

February 15, 2022

Senate Bill 528: Climate Solutions Now Act of 2022
SUPPORT with AMENDMENT

Chairman Pinsky and Members of the Committee:

The Climate Access Fund supports SB 528, Climate Solutions Now Act of 2022, with amendments. We thank Chairman Pinsky for his leadership on this bill.

My name is Lynn Heller. I'm the founder and CEO of the Climate Access Fund, a statewide nonprofit Green Bank that is focused on reducing the electricity bills of low-income households through access to community solar. The Climate Access Fund uses low-cost debt and a guaranty fund to incentivize community solar developers and their investors to serve more low-income households than they otherwise would. For the record, I am also honored to serve a Board Chair of the Maryland League of Conservation Voters.

The Climate Access Fund supports the Climate Solutions Now Act because we believe climate change is an urgent threat to Marylanders and the state needs to take action to reduce its impacts, especially in underserved and overburdened communities. SB 528 includes many important provisions aimed at reducing greenhouse gas emissions, creating jobs, improving the economy, and making our communities more resilient in the face of climate impacts, but I will focus my testimony on two specific provisions in the bill: the creation of a Climate Catalytic Capital Fund and the personal property tax exemption for certain community solar projects.

<u>The Climate Catalytic Capital Fund</u>

The Climate Catalytic Capital Fund (CCC Fund) would allocate funds for three years to the State's existing Green Banks. Green Banks are financing institutions that leverage private capital investment to accelerate the adoption of clean energy and energy efficient technologies, products and services. Maryland currently has two statewide Green Banks: the Maryland Clean Energy Center (MCEC), which finances the deployment of existing clean energy technologies and supports the commercialization of new technologies, and the Climate Access Fund (CAF), which focuses exclusively on clean energy access in low- to moderate- income (LMI) communities. Maryland's third Green Bank, the Montgomery County Green Bank, serves Montgomery County businesses and residents.

The Climate Access Fund supports the creation of the CCC Fund with the following three amendments:

(1) **Require Low- to Moderate- Income Benefit**. Require that 40% of the annual allocation be reserved for technologies, products or services that benefit low- to moderate-income communities, with a caveat that if there are not sufficient applications to MCEC for funding in that category, the funds will not be left unspent. As we have seen with the state's Community Solar Pilot Program, the private sector will not invest in LMI communities unless financial incentives are available. If we are serious about our commitments to environmental justice, we must do what it takes to attract private capital so that already overburdened communities also benefit from the clean energy economy.

(2) **Invest in the Climate Access Fund**. Require that 10% of the annual allocation go to the Climate Access Fund, one of the state's two statewide Green Banks along with MCEC, and the only Green Bank that focuses exclusively on clean energy equity. As currently written, SB 528 allows for MCEC to provide grants to other Green Banks, but it is not required to do so.

(3) **Increase Annual Allocation**. Increase the annual allocation from $5 million to $15 million a year. If the state is serious about fighting climate change, we must do more to accelerate our investment in clean energy. The Montgomery County Council recently passed a law allocating an estimated $18 million per year in perpetuity for the Montgomery County Green Bank to deploy in Montgomery County alone. An allocation of $5 million a year to accelerate clean energy deployment in the rest of the state is far too little given the scale of the climate problem.

<u>Personal property tax exemption – community solar</u>

The Climate Access Fund supports the personal property tax exemption for certain community solar systems that serve LMI customers. This tax exemption would encourage solar generation in communities that are burdened by environmental pollutants and help provide financial assistance to those LMI households. It is a win-win-win (environmental, economic, social) for the state.

Maryland's community solar pilot program is in entering its fifth year. Most community solar projects that are either operating or in development serve market-rate customers and are located on 10-12 acres of open land. Projects serving majority low-income customers, and projects located on land that has already been developed (rooftops and parking lots) tend to cost more and typically don't benefit from the economies of scale that large land-based projects do.

The Climate Access Fund is working to change that. We raise below-market debt, guaranty capital, and other types of financing from public and philanthropic sources (including the Maryland Energy Administration). We offer attractive financing to solar developers to incentivize the expansion of discounted clean energy for low- to moderate- income ("LMI") customers across the state.

The Climate Access Fund is focused in particular on developing rooftop projects located in or near underserved communities. We're currently working on a project located on the rooftop of a school in East Baltimore. Students' families (as well as faculty and staff at the school) who qualify as LMI will receive a 25% discount on their electricity bills, and will be given an opportunity to share in the ownership of the solar asset itself. The project also has a job training and an education component.

This kind of local participation and ownership works best when a project is located in the community it serves. Yet even with the Climate Access Fund's flexible capital, this rooftop project may not be possible without the proposed personal property tax exemption included in SB 528. The project's margins are simply too thin to withstand the tax. The financial benefits that this project and others like it across the state can bring LMI families -- by leveraging private capital -- are significant. We estimate that the electricity bill savings alone generated by the school project would amount to $35,000 a year for 175 LMI households (a total of $1.6 million over a generation), whereas the foregone personal property tax would be roughly $9,000 a year. The benefits to the local jurisdiction would be almost four times the cost.

Please note that the personal property tax exemption for this specific type of community solar project is also included in SB 264, in support of which the Climate Access Fund also testified.

The Climate Access Fund urges a favorable report on SB 528, with the amendments outlined above.

Thank you for your consideration.

Lynn Heller, CEO
Climate Access Fund Corporation
lynn@climateaccessfund.org
(410) 371-6276

SB 528 - MoCo_Elrich_SWA (GA 22).pdf
Uploaded by: Marc Elrich
Position: FWA

OFFICE OF THE COUNTY EXECUTIVE

Marc Elrich
County Executive

February 15, 2022

TO: The Honorable Paul G. Pinsky
Chair, Education, Health, and Environmental Affairs Committee

FROM: Marc Elrich
County Executive

RE: Senate Bill 528 – *Climate Solutions Now Act of 2022* – Support with Amendments

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I am writing to express my strong support for Senate Bill 528 – *The Climate Solutions Now Act of 2022,* which updates Maryland's climate goals to match the science-based targets required by the Paris Climate Accord and establishes foundational programs to achieve those goals.

We are in a climate emergency. The United Nations Emissions Gap Report of 2021 includes the following proclamation: "Climate Change is no longer a future problem. It is a now problem." If we are going to meet the Paris Climate Agreement's goal of staying below a 1.5 degree Celsius rise this century, the world must reduce emissions by 50% before 2030.

The Climate Solutions Now Act reflects Maryland's commitment to being part of that solution. It updates the State's emissions reduction goals to 60% by 2030 and net-zero by 2045. The Act only begins to lay out that path. While it will not be easy, it offers tremendous opportunity for the State to become a healthier, more equitable, and more prosperous place to live.

The Act lays out workforce development initiatives to bring more green jobs to the State, starting with corps programs for training young workers in resilient infrastructure and renewable energy deployment.

The requirements for net-zero schools and the use of zero-emissions buses will make it clear to our students that we are serious about their futures. In fact, in Montgomery County, we showed just *how* serious we are about changing the dynamic by approving an agreement last year that was the largest procurement for zero-emissions buses in the nation.

The Climate Solutions Now Act must allow for continued collaboration between the State and counties. Montgomery County has some of the nation's most ambitious climate goals – an 80% reduction in emissions by 2027 and 100% by 2035. To reach these goals, we need the State and the Climate Solutions Now Act to continue to support the efforts of our counties.

Another bill before the General Assembly this Session, Senate Bill 81/House Bill 61, enables counties to create real enforcement penalties for Building Energy Performance Standards. The use of Building Energy Performance Standards is crucial to achieving local climate goals, and many jurisdictions across the country have successfully enacted these standards in response to their climate commitments, including Washington, D.C., New York City, St. Louis, Denver, and Boston. Standards we have drafted for Montgomery County are before the County Council now. We anticipate the number of jurisdictions that have established Building Energy Performance Standards will grow significantly in the coming years, with assistance from the White House Council on Environmental Quality's National Building Performance Standards (BPS) Coalition launched on January 21, 2022. Montgomery County, Prince George's County, and the City of Annapolis have signed on as BPS Coalition participants along with many other jurisdictions nationwide. Because I believe it is important to protect the local authority that currently exists to establish these standards, the County is requesting that the Climate Solutions Now Act be amended to ensure this authority remains intact.

The Climate Solutions Now Act also allows community solar equipment in certain areas supporting a majority low- or moderate-income customers to be exempt from county and municipal property taxes. These exemptions can serve as incentives to solar energy deployment, and I would request that counties be granted enabling authority to offer property tax exemptions for any solar equipment.

Equity is also an important lens to apply when developing climate goals and programs. The Climate Solutions Now Act requires updates of annual reports to better understand how State funds are spent each year. I encourage the State to create ambitious goals as part of the Climate Solutions Now Act to be sure equity is at the forefront of these actions.

A concern that I would share relates to the importance of ensuring that the collaboration between the counties and the State will continue since neither can succeed independent of one another. For that reason, for your consideration, I have attached a set of amendments suggested by Montgomery County Department of Environmental Protection's climate change staff to further that goal.

This is an important point in time. And time is not on our side. We must more aggressively use all the tools we have to address the rapid pace of climate change and the impacts that we are experiencing with greater frequency every day. I urge you to act expeditiously and favorably on this legislation.

cc: Members of the Education, Health, and Environmental Affairs Committee

AMENDMENT REQUESTS

1. Add a new section 2-1604, (Building Emission Standards) to explicitly not preempt counties and local municipalities from enacting their own Building Emissions or Energy Standards: *2-1604. Authority to enact local standards. "This subtitle does not affect the authority of a county, municipality, or other local government to enact building emissions or energy standards that are at least as stringent as the standards established in this subtitle."*

2. Section 7-237 (Page 46, lines 13-21) creates exemptions for County or Municipal property tax for machinery or equipment installed on rooftops, parking lots, roadways, or brownfields, that is part of a community solar energy generating system, serving 51% of low- or moderate- income customers: County staff recommends expanding this exemption to any solar equipment.

3. Sections 1-701 and 1-702 (pages 9-12) create strategies to address environmental justice and the disproportionate effects of climate change on disadvantaged communities and sets goals for State funding: *County staff recommends attaching goals to these efforts in the Climate Solutions Now Act to ensure environmental justice is at the forefront of the State's climate efforts.* For example, the State could adopt a similar 40% goal as the Justice40 Initiative. Justice40 is a Federal requirement for at least 40% of the benefits of federal investments be for disadvantaged communities and tracks performance.

4. Section 12-503 (page 35, lines 10-16) for creating building standards allows for a local waiver based on the social cost of carbon calculations provided by the Department: *County staff recommends that these waver opportunities be removed or reviewed by the State.* For example, waivers may be given for water and heating equipment if cost is greater than the social cost of the GHGs, as determined by the local jurisdiction. This will be challenging if not impossible to enforce for local jurisdictions to examine the waivers and doesn't align with the efforts of the Act.

5. Section 3-602.1 (page 37, line 26) requires state funded buildings (any building receiving 25% of funding from the state) of 7,500 square feet or greater of new construction or major renovations must meet High Performance Building Requirements of LEED Silver and to also meet or exceed LEED Zero or achieve a net-zero energy balance (page 38, lines 11–18): *County staff recommends a minimum LEED Gold requirement.* LEED Silver is not in alignment with LEED Zero or net-zero energy balance.

SB_528_MDuerBalkind_fav-ammend.pdf
Uploaded by: Marshall Duer-Balkind
Position: FWA

February 14, 2022

Testimony of Marshall Duer-Balkind
To the Maryland General Assembly Senate Committee on Education, Health, and Environmental Affairs
Re: Senate Bill 528 (SB0528),"The Climate Solutions Now Act of 2022"
Position: Favorable with Amendments

Dear Senator Pinsky and Members of the Committee:

My name is Marshall Duer-Balkind, and I am pleased to offer testimony on SB 528, the "Climate Solutions Now Act of 2022." I am a resident of Mount Rainier, Maryland, in Prince George's County. For the record, I am an Associate with the deep green engineering firm Integral Group, and co-chair of "Building Energy Performance Standards Task Force" for the District of Columbia. However, I am testifying today solely in my personal capacity.

The Climate Solutions Now Act of 2022 is an inspiring and visionary piece of legislation for the State of Maryland. It is the bold bill we need to meet the challenge posed by climate change and put Maryland in a leadership position. However, there multiple opportunities available to amend the bill and make it stronger, more effective, and more just. While there are many issues raised in the bill, I am testifying today primarily on Subtitle 16, Building Emissions Standards.

Over the past few years, Building Performance Standards, or BPS, have been recognized as a leading policy for driving reductions of emissions from existing budlings. Washington, DC was the first jurisdiction in the United States to adopt a BPS. Since then, seven other jurisdictions have adopted their own BPS laws—including two states Washington State and Colorado. Montgomery County, Maryland, has introduced its own BPS legislation (Bill 16-21).[1] On January 21, 2022, the White House announced a National Building Performance Standards Coalition of 33 cities and states that have or intend to adopt BPS policies—including Montgomery County, Prince George's County, and the City of Annapolis.[2] With this bill, the State of Maryland takes its rightful place among this group.

I have been working on Building Performance Standard (BPS) policies since 2014: I co-authored the first municipal studies on BPS policies for Washington, DC in 2014; oversaw the District of Columbia Comprehensive Energy Plan which further expanded the concept; helped write the bill that implemented that plan and established the first BPS in the U.S.; and, since 2019, I have served as the co-chair of the Mayor's Building Energy Performance Standards Task Force. I am also actively advising multiple governments across North America on BPS policies.

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[1] Montgomery County Department of Environmental Protection. *Building Energy Peformance Standard.* https://www.montgomerycountymd.gov/green/energy/beps.html
[2] Institute for Market Transformation. *National BPS Coalition. https://nationalbpscoalition.org/*

New Construction Standards

The bill requires all new buildings to "meet all water and space heating demand without the use of fossil fuels" (page 35). This requirement is highly impactful and visionary. With it, Maryland would join New York City and many west coast municipalities in banning new buildings from connecting to natural gas. However, the bill does not fully consider the role of District Energy Systems, nor is it aggressive enough on energy efficiency and embodied carbon.

District Energy Systems

A district energy system, or DES, is a highly efficient way of providing heating and cooling to a group of buildings, often in a campus setting, such as at a higher education or medical institution. Currently, almost all DES use natural gas and other fossil fuels to generate steam or hot water that is the supplied to buildings. However, it is possible to transform these systems to be fossil-fuel free, using electricity, geothermal heat pumps, and low-temperature hot water to deliver high-efficiency, carbon-free district energy to buildings. In my professional work, I have advised multiple leading universities—including the University of Michigan and Swarthmore College—on energy master plans that will fully decarbonize their campuses. Due to the complexity and expense of retrofitting a DES, most master plans for DES electrification take over a decade to implement.

As written, a new building in a campus with a DES would be required to be all-electric and not be connected to the DES. There are substantial cost and efficiency losses from such an approach. If an institution has a plan to fully convert its district energy system to a carbon-free system, they should be allowed to connect new buildings to it in the meantime. I propose that the bill create a process whereby the owner of a district energy system may submit a transition plan to the State, that demonstrates the system will be converted to solely use electric and/or renewable resources by 2040, with the exception of emergency backup. Local governments should be authorized to grant a variance for buildings to connect to a DES with a State-approved transition plan.

Net-Zero Energy

Secondly, while the bill requires that new buildings meet the efficiency requirements of the IECC, it does not go any further. All electric buildings that are not highly efficient will increase strains on the electric grid and may increase the energy costs for businesses and residents. New buildings can be built to highly efficient, net-zero-energy-ready standards. Washington, DC has adopted an optional "Appendix Z" that provides a definition of a "net zero energy" building in building code language—and by 2026, all new buildings in DC will need to be net zero energy buildings.[3] In California, all new buildings must be NZE by 2030. I recommend that in addition to requiring buildings be fossil-fuel

[3] DCMR 2017-12-I[CE]Z https://dcregs.dc.gov/Common/DCMR/RuleList.aspx?ChapterNum=2017-12-I[CE]Z

free by 2023, the law require that, by 2030, the energy code be amended to achieve net-zero-energy-ready levels of efficiency.

Cost of Carbon

The bill authorizes local jurisdictions to grant a variance if the incremental cost of building to all-electric standards exceeds the social cost of the carbon for the greenhouse gasses that could be reduced through compliance. While well-intentioned, this clause has several issues:

1. It is easy to "game" cost-effectiveness testing to make it appear that a requirement isn't cost effective. This can be done most easily by making very "conservative" assumptions for the first cost of energy measures, and assuming a high discount rate.
2. The EPA does not publish one single social cost of carbon—they publish a range of values at different discount rates and percentiles of impact. The current 2020 rates range from $14 to $152 per ton of Carbon Dioxide Equivalent (tCO2e), with $51/$tCO_2$e being the default value.[4]
3. $51/$tCO_2$e is too low to provide the needed impact. I know from my work that the "carbon abatement costs" of decarbonization projects are often well over $100/$tCO_2$e.
4. No social cost of carbon analysis currently accounts for the loss of human life due to climate disasters. Yet from Texas to California, we are already seeing people die in disasters caused by climate change. If carbon costs truly accounted for the cost of lost lives, the social costs of carbon would likely be over $250/$tCO_2$e and could be north of $500/$tCO_2$e.[5]
5. The social cost of carbon is fundamentally not designed to be compared to a do-nothing alternative. Rather, the social cost of carbon is designed to allow the external impacts of carbon emissions to be incorporated energy prices and cost analysis.

Given these factors, I recommend that this clause be struck from the bill. Alternately, the bill could direct the Department to select a social cost of carbon that is in line with the 95th percentile for carbon impacts (presently, this would put the value at $152/tCO2e).

Embodied Carbon

The bill focuses solely on operational emissions from new buildings, and primarily on direct emissions. However, as we move towards net zero emissions buildings, the carbon that is emitted through building construction becomes a bigger and bigger piece of building's total lifecycle impacts. The carbon emitted in the production and assembly of building materials is known as "embodied carbon"—concrete and steel being the two biggest sources of embodied carbon for most buildings.

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[4] U.S. Government. *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide, Interim Estimates Under Executive Order 13990.* (2021). https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

[5] Bressler, R.D. The mortality cost of carbon. Nature Communications 12, 4467 (2021).https://www.nature.com/articles/s41467-021-24487-w.pdf

The first step to managing embodied carbon is simply getting people to measure it. While tracking embodied carbon once required an expensive custom Lifecycle Assessment (LCA), the free *Embodied Carbon in Construction Calculator (EC3)* tool from the Carbon Leadership Forum and Building Transparency makes tracking embodied carbon easier than ever before.[6] The bill should include a requirement that any new buildings over 25,000 ft^2 must submit an embodied carbon report prior to receiving their Certificate of Occupancy.

Existing Building Standards

The bill appears to contain a printing error where similar but not identical versions of the proposed 2-1602 appear on pages 46-47 and 48-49, respectively. Most importantly, the first version of 2-1602 includes net zero emissions requirement for buildings not owned by the State, while the latter does not. All my comments relate to the first version. I recommend the duplicate language on 48-49 be struck.

Emissions Scopes

Under all best practice global accounting protocols, emissions from buildings include both "Scope 1" direct emissions (which are directly generated through combustion of fossil fuels onsite) and "Scope 2" emissions from electricity and from district energy systems. It is not entirely clear whether the emission reduction requirements in 2-1602(A) apply only to "Scope 1" direct emissions or to all emissions. However, the fact that 2-1602(B) requires reporting for direct emissions implies that the standards are likewise focused only on direct emissions. This is a mistake.

Focusing only on direct emissions may end up ignoring emissions from a district energy system, depending on how reporting occurs—if a campus reports their data at the campus level, emissions from the central plant will be a scope 1 emissions source, but if each building on the network is reported separately, those emissions will be a scope 2 source that can be ignored. This creates a substantial loophole. No other jurisdiction with a BPS ignores district energy system emissions—Maryland should not either.

Moreover, focusing on direct emissions also ignores energy use and emissions from electricity. While the State of Maryland has an aggressive Renewable Portfolio Standard (RPS), we cannot put all our eggs in that one basket. Compliance with the RPS relies on Renewable Energy Credits (RECs) from the massive PJM region, and entirely ignores temporal considerations. As we move toward a net zero emissions electricity system, time of use factors will be increasingly important—renewable electricity must be available when and where it is needed, not just somewhere at some point. If the Standards do not require increased efficiency of electric use, it will be that much harder to source sufficient renewable electricity or maintain a stable grid. Finally, if the standards do not include

[6] Building Transparency. EC3.https://www.buildingtransparency.org/

electricity, a building owner who passes all utility costs on to their tenants could install an electric boiler or electric baseboards, meeting the standards while saddling tenants with massive increases in energy bills. That said, I do recognize that building owners may balk at needing to comply with emissions standards when the future grid emissions intensity is unstable or unknown.[7]

Site Energy Use Standards + Onsite/District Emissions Standards

As a solution to these problems, I propose that instead of focusing just on direct emissions, the bill should set two complementary standards: an "*Onsite + District Emissions Standard*" and an "*Energy Use Intensity Standard*."

1. *Onsite + District Emissions Standard*

   The bill should clearly state that the net greenhouse gas emissions standards relate to both direct onsite emissions and indirect district energy emissions. These standards will thus promote electrification of both buildings and district energy systems and avoid creating a loophole to campuses.

2. *Normalized Site Energy Use Intensity*

   Many BPS policies focus not just on emissions but also in energy use and energy efficiency. Site Energy Use Intensity is the energy use at the building (as measured in utility bills) divided by the building's gross floor area. It is the industry-standard metric for energy efficiency of a building. ENERGY STAR Portfolio Manager normalizes Site EUI for weather, and EPA is working on developing algorithms that allow for the normalization of Site EUI based on business activity factors such as occupancy or operating hours. These normalizations make the standards fairer for diverse building owners and uses. Washington, DC's Building Energy Performance Standard (BEPS) and the proposed Montgomery County BPS both focus on Site EUI.

   Montgomery County's BPS follows an innovative model for regulating Site EUI based on the "model BPS ordinance" from the Institute for Market Transformation.[8] In order to account for differences in building use and conditions, each building follows its own trajectory towards a common final Site EUI target. Each building type gets its own Site EUI target, and interim progress towards that target is measured in regular intervals—see Figure 1 for an illustrative example.

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[7] Other jurisdictions with BPS policies are exploring two approaches to grid emissions: some, like New York City, have set specific emissions intensity factors for the electric grid, while others, including Washington, DC and the City of Vancouver, Canada, are exploring emissions standards as applied to both onsite and district emissions only, while looking to energy standards to address electricity.

[8] Institute for Market Transformation. Summary of IMT's Model Ordinance for a Building Performance Standard. (2021). https://www.imt.org/resources/imt-model-bps-ordinance-summary/

Figure 1: BPS Trajectory Stylized Example (courtesy of the Institute for Market Transformation)

I recommend the bill charge the Department with setting final 2040 Site EUI targets for each building type. Then, at 2030 and 2035, along with achieving the specified Onsite + District emissions reductions, building owners would also demonstrate progress along the trajectory to the 2040 Site EUI target. For simplicity, covered buildings owned by the state should also have a 2040 final Site EUI target, though they will still need to reach net zero emissions by 2035.

Washington, DC, is currently examining replacing our current BEPS system with a new emissions standard. The Department of Energy & Environment has analyzed multiple scenarios and found that the deepest emissions savings occur in a scenario where a Site EUI trajectory approach is paired Onsite + District GHG emission standards.

Reporting

The bill requires owners of covered buildings to report direct emissions beginning in 2025. As noted above, I believe this should be expanded to encompass all Scope 1 and 2 GHG emissions. Moreover, the bill should be clearer on when and how building owners must report. Reports should be due each year by May 1st, and the bill should make clear that reporting should be for data from the previous calendar year. Due to utility billing cycles, building owners are unlikely to be able to report data any earlier than April 1; May 1 is a safer date. Specifying that the data is for the previous calendar year will avoid confusion. Reporting should be via the U.S. Environmental Protection Agency's *ENERGY STAR® Portfolio Manager® online* platform. Every single benchmarking or performance standard program in North America uses ENERGY STAR Portfolio Manager. It is easy to use, free, and industry-standard. There is no good reason to develop or use any custom system, and the Assembly can avoid confusion, expense, and needless bureaucratic effort by specifying the use of Portfolio Manager in this legislation.

Alignment with other jurisdictions

Montgomery County has pending legislation to create a BPS policy, and both Prince George's County and the City of Annapolis have pledged to the White House to adopt their own BPS policies. The statewide Building Emissions Standard in this legislation should contain provisions to address this. Building owners should not be required to meet two similar but distinct regulatory requirements from two levels of government if it can be avoided.

Fortunately, there is a good example of how to manage overlapping building benchmarking and performance policies already. California has a statewide benchmarking law (AB 802), and multiple cities have their own. The California Energy Commission (CEC) created a process whereby a municipality/county can apply for an exemption that allows compliance with their municipal law to also count as compliance with the state law—so long as local benchmarking requirements are equally or more stringent than the state requirements, and the municipalities agrees to share data with the state. To date, seven California cities have received exemptions.[9]

I recommend this law take a similar approach. Local governments with their own BPS policies should be able to apply for a waiver from the Department. The waiver should be based on whether the local BPS will provide all the same data as the statewide policy and determines that a building meeting the local requirements would also meet the state requirements. (For example, Montgomery County's law sets the final target date a 2035. If that law also required net zero emissions by 2035 (which it does not currently), then that would be more stringent that this bill.) If a building owner in a local jurisdiction that has received this waiver complies with the local policy, that should also count as compliance with the state building emissions standard regulations.

Regulatory Details

- In 2-1602(C)(2)(I), the Department is charged with providing "maximum flexibility" to the owners of covered buildings. This language is far too broad—it could lead to distortions, inequitable outcomes, complex schemes like emissions trading, or even the use of carbon offsets. I recommend the work "maximum" be struck.

- In 2-1602(C)(2)(III), the Department is charged with including financial incentives in the regulation. Financial incentives are good—but by and large they do not belong in a regulation or rulemaking. I recommend this clause be moved to a new subsection 2-1602(D).

- Finally, In 2-1602(C)(3), the bill once again references the social cost of greenhouse gasses. I have noted my general concern about the level of this use of the social cost of carbon above.

[9] California Energy Commission. *Exempted Local Benchmarking Ordinances.* https://www.energy.ca.gov/programs-and-topics/programs/building-energy-benchmarking-program/exempted-local-benchmarking

In addition, I would point out that most existing BPS policies have far higher penalties than the social cost of carbon. For example, New York City's Local Law 97 performance standard sets fines for non-compliance at \$268/tCO_2e. Most importantly, the social cost of carbon is simply not the right point of comparison. The proper benchmark is whether *the cost of compliance exceeds the cost of non-compliance*. In Washington, DC, the BEPS Task Force was united in holding that this is how fees should be set. If it is cheaper to do so, many building owners will simply pay the fees—especially since "fees," unlike "fines" can often be passed on to tenants. DC did a cost-benefit study that found the costs of compliance with DC's BEPS average around \$10/ft^2—and then set the penalties at this level. I recommend the legislation charge the State with conducting a similar study, and using that, not the social cost of carbon, to set the fees.

In Closing

Thank you for reading and considering my comments. I have provided potential amendment language for many of my recommendations below. I would also be happy to discuss any of these points, or other questions you may have, with you or your staff members at your convenience. I hope to work with you on creating the best possible Building Emissions Standards for the State of Maryland.

Sincerely,

Marshall Duer-Balkind
4106 31st Street, Mount Rainier, Maryland 20712

Addendum: Potential Amendment Language

Page 34:

Add a new section (b)(1)(iv) that reads *"consider changes to the International Building Code that achieve net-zero-energy ready levels of efficiency by 2030."*

Page 35:

Add a new subsection (II)2 that reads *"A local jurisdiction may grant a variance from the requirements of subparagraph (I)1 to allow a building to connect to an existing District Energy System, provided that the owner of the District Energy System has been granted a waiver by the Department for an approved net-zero emissions transition plan that shows the system will be retrofitted to have net zero emissions prior to January 1, 2040."*

Add a new subsection (I)3 that reads *"A requirement that new buildings over 25,000 ft2 submit an embodied carbon disclosure report that conforms to as-built conditions, prior to receiving a Certificate of Occupancy."*

Page 47:

2-1602(A)(1)(I): strike "*Net Greenhouse Gas Emissions"* and replace with "*Net Onsite and District Greenhouse Gas Emissions and 25% progress toward Normalized Site Energy Use Intensity standard, both relative to 2025,*"

2-1602(A)(1)(II): strike "*Net Zero Greenhouse Gas Emissions*" and replace with "*Net Zero Onsite and District Greenhouse Gas Emissions and 50% progress toward a Normalized Site Energy Use Intensity standard, relative to 2025*"

Add 2-1602(A)(1)(III): *"A Normalized Site Energy Use Intensity Standard on or before January 1, 2040; and"*

2-1602(A)(2)(I): strike "*Net Greenhouse Gas Emissions"* and replace with "*Net Onsite and District Greenhouse Gas Emissions and 20% progress toward a Normalized Site Energy Use Intensity standard, both relative to 2025,*"

2-1602(A)(2)(II): strike "*Net Greenhouse Gas Emissions*" and replace with "*Net Onsite and District Greenhouse Gas Emissions and 40% progress toward a Normalized Site Energy Use Intensity standard, both relative to 2025,*"

2-1602(A)(2)(III): strike "*Net Zero Greenhouse Gas Emissions*" and replace with "*Net Zero Onsite and District Greenhouse Gas Emissions and a Normalized Site Energy Use Intensity standard*"

2-1602(B): Strike the word "*direct*" and replace with "*energy use and Scope 1 and 2 Greenhouse Gas*".

2-1602(B): At the end of the paragraph, strike "*in 2025*" and replace with "*on May 1, 2025, for calendar year 2024 data. Thereafter, emissions data shall be reported by May 1 of each year for the previous calendar year. Data shall be reported using ENERGY STAR Portfolio Manager software published by the U.S. Environmental Protection Agency. Should this software cease to be available for this purpose, the Department may designate an alternative reporting platform.*"

2-1602(C)(2)(I): strike the word "*maximum*"

2-1602(C)(2)(III): strike this section and replace with "*Allow owners of buildings in a local jurisdiction with its own similar Building Performance Standard to comply with the requirements of this section through complying with the local requirements, provided the Department has issued a waiver finding that energy and emissions savings under the local program meet or exceed the requirements of this section."*

2-1602(C)(3): add at the end: "*, or the average estimated cost of compliance as determined by a generalized cost-benefit study conducted by the Department."*

2-1602: Add a new subsection (D) that reads "*To the extent authorized by law, the Department shall provide and support financial incentives recommended by the Building Energy Transition Implementation Task Force*."

<u>Pages 48-49</u>

Strike the second variant of Section 2-1602 that appears on Pages 48-49, as this duplicates the previous section while missing some critical language.

Anne Arundel County _FWA_SB 528.pdf
Uploaded by: Matt Johnston
Position: FWA

ANNE ARUNDEL COUNTY
MARYLAND
County Executive Steuart Pittman

February 15, 2022

Senate Bill 528

Climate Solutions Now Act of 2022

Committee: Education, Health, and Environmental Affairs

Position: SUPPORT WITH AMENDMENTS

Anne Arundel County **SUPPORTS SB 528 WITH AMENDMENTS**. The passage of this bill is critical to achieving meaningful greenhouse gas emission reductions across our state that are contributing to rising sea levels along Anne Arundel County's shorelines, increasing the severity of flash floods in our communities, and impacting our farmers and urban neighborhoods with heat waves.

There are many actions we can take on a local level to reduce greenhouse gas emissions and mitigate climate change, but these actions only extend to our borders. When it comes to a universal problem like greenhouse gasses, we need financial support and leadership from Annapolis to meet statewide climate goals. This bill provides both of those things.

Specifically, the bill's investments in net zero school grants, EMPOWER energy efficiency grants, a Climate Transition and Clean Energy Hub, a Climate Catalytic Capital Fund, and green bonds will provide much needed financial assistance to the local governments, residents, and businesses who are leading this state's transition to a clean energy economy.

As a local government, we have years of experience implementing programs that reduce greenhouse gas emissions, and we believe there are lessons we can take from that experience to improve the bill through amendments.

Specifically, we request that the Committee consider amending the bill in the following ways:

- Provide local governments the authority to set their own local tax incentives for solar projects so that those of us who wish to encourage investments in solar energy that go beyond those envisioned by this bill will finally have the authority to do so;
- Protect beneficial clean energy projects - such as solar arrays - that have been built, or will be built in the coming years, on closed landfills by providing a waiver process for such sites in the proposed, new methane regulations;
- Create a pilot program that would allow local governments and public institutions purchasing costly renewable energy certificates (RECs) from newly built clean energy projects to apply for reimbursement of a portion of the RECs cost, thereby lowering the cost of clean energy commitments for local governments and public institutions and encouraging the construction of new projects across the state; and
- Establish a green building code and energy efficiency task force comprised of local governments, green building experts, and other stakeholders, and direct the group to design new green building

Peter Baron, Government Affairs Officer Phone: 443.685.5198 Email: Peter.Baron@aacounty.org

codes, model ordinances, draft regulations, and a timeline for the progressive implementation of new standards between now and 2040.

For these reasons, Anne Arundel County requests the committee **SUPPORT SB 528 WITH AMENDMENTS**.

Steuart Pittman
County Executive

Peter Baron, Government Affairs Officer Phone: 443.685.5198 Email: Peter.Baron@aacounty.org

WISE Testimony SB528.pdf
Uploaded by: Monica O'Connor
Position: FWA

Committee: Education, Health & Environmental Affairs
Testimony on: SB528 - "Climate Solutions Now Act of 2022"
Organization: WISE
Person Submitting: Monica O'Connor, Legislative Liaison
Position: Favorable with Amendments
Hearing Date: February 15, 2022

Dear Mr. Chairman and Committee Members:

Thank you for allowing our testimony today. WISE is an all-volunteer women-led group of advocates formed in Anne Arundel County, and has over 600 members. WISE urges you to vote favorably on SB528.

First, SB528 tasks the existing Maryland Commission on Environmental Justice and Sustainable Communities to solicit input from all segments and communities in developing strategies to address the priorities of environmental justice communities, and to reduce greenhouse gas emissions and co-pollutants in the communities that have a disproportionate concentration of polluting industries and highways. The commission will also coordinate with vulnerable communities that are particularly challenged by storm surges, heat islands, lack of tree canopy and other effects attributable to climate change and to coordinate with and report to the Maryland Commission on Climate Change and the Maryland Department of the Environment (MDE), from which the MDE will act on those recommendations.

Similarly, the bill establishes a Just Transition and Retraining Work Group, composed of representatives of labor, the NAACP, and formerly incarcerated individuals, as well as registered apprenticeship sponsors, representatives of the solar and wind industry to assist in a just transition.

Additionally, SB528 creates a Climate Justice Corps composed principally of young people to create career training opportunities in the new green economy, particularly for youth from disadvantaged communities. ***However, with respect to this particular provision, we agree with Sunrise that the Corps should also provide good jobs, with good pay and good health benefits so that individuals from disadvantaged communities can truly take advantage of the career training opportunities in the program. In this regard, we recommend coordinating with Senate President Ferguson who sponsored SB228***, a bill that amends the current Maryland Corps program and that has the opposite problem – it provides good jobs, but does not provide the same career development opportunities in the developing green economy.

We also strongly support the other top line goals of the legislation, but we would like to focus our remaining testimony upon the buildings and schools pieces.

Because buildings constitute 40% of Maryland's greenhouse gas emissions and 90% of its electricity consumption, it is critical, as this bill does, to address those emissions from both new and existing buildings.

Building Emissions Standards, All Electric Code for water and space heating, and Adoption of the International Green Construction Code:

The bill requires adoption of an above code all electric construction code and the International Green Construction Code. These provisions will position new buildings in Maryland to reduce their greenhouse gas emissions by not relying on fossil fuels and to focus on sustainable building materials and other sustainability measures.

- **The Building Emissions Standards** will require commercial and multifamily buildings that are 25,000 square feet or large to reduce their greenhouse gas emissions 100% by 2040, with interim targets; and for public buildings to reach that target by 2035. It also includes a number of smart complementary components that make the program work for the public:
    -

- **The Climate Transition & Clean Energy Hub** which acts as a clearinghouse for information, technical advice and financial incentives for the public and professionals;
- **The Climate Catalytic Capital Fund** to provide the MCEC (Maryland's Green Bank) financing that includes C-Pace financing and creation of a green bonds program. These aspects allow financing to attach to the building itself, which is important for private owners, and the green bond fund will help to attract private capital to further enhance the utility of the fund. Depending on the program, every $1 of public investment in green bank funding generates $4 to $7 of private capital.
- **The Building Energy Transition Implementation Task Force**- to develop recommendations for further complementary programs and incentives aimed at reducing greenhouse gas emissions from the building sector; and
- **The Expansion of the utilities' EMPOWER** program that will expand and increase rebates and other energy efficiency measures for consumers.

Energy Efficiency

It is equally critical to increase the energy efficiency of our buildings. One key reason buildings constitute 40% of Maryland's greenhouse gas emissions is because of their outsize draw on the grid, which is not yet clean. Also, as we transition to a fossil free economy, we need to reduce the buildings sector's draw on the grid in order to maintain the integrity of the grid. We therefore ask that SB528 require an energy use reduction pathway.

Schools

SB528 is more conservative than it needs to be with respect to schools by providing only for a pilot program for net-zero schools. We already know that the upfront construction costs of net-zero and net-zero ready schools are comparable to the costs of conventional schools, as proven by the two net-zero schools in Baltimore. Those schools were built at a cost of $358 and $364 (including the solar panels) per square foot with site preparation as compared to $360 per square foot for conventional schools in that same year of construction. And of course these schools will have substantially lower operating costs because they consume substantially less energy. These energy savings are all the more important when you consider the MCCC has projected that gas delivery charges will increase 2 to 5 times by 2045 over

current rates. Finally, by using the zero energy buses that are another aspect of SB528 as battery backup (as is being developed in Montgomery County), schools can act to further reduce their draw on the grid (or even to provide additional energy to the grid) and serve to strengthen our schools' ability to act as important resiliency hubs in times of emergency.

At a minimum, schools should be required to be net-zero ready so they can add solar panels at a later day.

For these reasons, we urge you to adopt our proposed amendments and vote favorably for SB528.

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

  F. "Major Renovation" means a renovation project:
    - For which the total projected cost exceeds 50% of the assessed value of the existing building; or

- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25–year period for all buildings funded at least 25% by the State.
- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
  - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
  - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
  - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
  - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):

A. The Installation of Solar Energy Systems

- To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
- Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
- Will be 20 stories or less in height, above grade plane.

B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:

- incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
- shadow studies indicate that 25% of a building's roof area will be in shadow.

        - Clarify the definition of “Solar Ready” to include the 40% roof set aside and the necessary electrical panel and conduit requirements.
- Delete “subject to the availability of funding” on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. “Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a ‘high performance building” under § 3-602.1 12 of the state finance and procurement article

OR

- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

MD Senate Climate Solutions Now.pdf
Uploaded by: nanci Wilkinson
Position: FWA

Committee: Senate Education, Health and Environmental Affairs
Legislation: SB 0528 Requiring the State to reduce statewide greenhouse gas emissions through the use of various measures, including the alteration of statewide greenhouse gas emissions goals, the establishment of a net-zero statewide greenhouse gas emissions goal, the development of certain energy efficiency and electrification requirements for certain buildings, and requiring electric companies to increase their annual incremental gross energy savings through certain programs and services,etc.
Organization: Environmental Justice Ministry, Cedar Lane Unitarian Universalist Church
Position: Favorable with Priority Amendments (attached)
Hearing: February 15, 2022

Dear Committee Chair and Committee Members,

The Environmental Justice Ministry strongly supports SB 0528 because it addresses key issues that will overall target systemic climate change issues that are an existential threat to human survival. Our faith holds the respect for the interdependent web of all existence of which we are a part which this bill highlights in climate friendly actions for the reduction of carbon and methane emissions with many complementary essential actions.

In summary, those actions are:

GHG Reduction Targets & Methane Accounting:
60% by 2030; **100%** by 2045
METHANE EMISSIONS From Landfills:
Municipal solid waste landfills required to monitor & report methane emissions to mde
Agency Consideration of Climate

1. Each state agency shall consider Maryland's greenhouse gas reduction goals & impacts of climate change, incl. Sea level rise, storm surges & flooding, increased precipitation & extreme whether in its planning, regulatory, & fiscal programs
2. Shall identify and recommend changes to existing pgms that do not support State's greenhouse gas reduction efforts or address climate change

123 **Article – Economic Development**
Green Bank: Climate Catalytic Capital Fund in MCEC
Purpose: Promote Environmental Justice/Leverage Private Capital to accomplish goals of CSN

1. Facilitate electrification of transportation sector
2. Building energy efficiency and ghg reductions
3. Expand deployment of clean energy generation & energy storage
4. Target implementation of energy & weatherization for lmi;
5. Optimize community scale infrastructure resilience & energy equity
6. Cutting edge clean energy technology
7. Create Maryland Green Bond Program
8. 2024 - 2026, appropriate $5 mil each year [note: way too low]

Establishes Environmental Justice & Sustainable Communities Commission

Establish a Just Transition Employment & Retraining Working Group
Duties:

Establish **Maryland Climate Justice Corps**
Purpose:

- Promote climate justice & assist state in achieving ghg goals
- Opportunities for young adults
- Mobilize, educate & train youth to deploy clean energy technology & mitigate and prevent environmental & health impacts of climate change on disproportionately affected communities
- Oppties for disadvantaged youths to be trained for careers in green-collar jobs

Zero-Emission Vehicle School Bus Transition Fund

1. Beginning 2024, school districts can only purchase zero-emission buses (w/ exception if none available, county can't get federal, state or private $$ to fund difference);
2. Can enter into agreement w/ electric to get $$ in exchange for their use to use buses as storage batteries

Zero Emission State Fleet

1. Passenger vehicles: ramp up to all ev by 2030
2. Light Duty vehicles: ramp up to all ev by 2036 (w/ certain exemptions)

Schools: New Construction

1. **New Schools will be High Performance Buildings** (don't need to be net-zero or ready)
1. **Net-Zero School Grant Pgm**
1. By 2030, energy for state facilities shall be at least 75% low-carbon renewable energy source [Defined as solar, wind, geothermal, ocean, hydro-electric]

Buildings: New Construction & Major Renovations

1. By 2023, all new construction all-electric for water & space heating needs)
2. Solar-ready
3. EV charging ready
4. Building Grid interaction
5. Local jurisdictions can vary IF-cost-effectiveness test developed by Dept. of Labor says the incremental cost is greater than the social cost of ghg reductions that would be reduced by complying w/ requirement
6. Even if get variance, buildings shall still be required to comply with electric ready standards

IGCC: International Green Construction Code [Note: recommended mod: ensure Maryland adopts all of the provisions of IGCC and sets ambitious Zepi codes to get us to Net Zero by 2040]

1. Jan. 2023, adopt IGCC
2. Local jurisdictions must enforce current version & any local amendments

Building Emission Standards (Existing bldgs).

1. Covers commercial & multi-family, 25,000 sq. feet or greater. Excludes schools, historic properties
2. State bldgs: 100% net reduction in ghg emissions by 2035; 50% by 2030

3. Commercial/multifamily: 100% ghg reduction by 2040; 40% by 2035; 20% by 2030
4. Report benchmarking by 2025 to report direct emissions

Climate Transition & Clean Energy Hub

Purpose: To serve as clearinghouse for information on advanced technology & architectural solutions to reduce ghg emissions from building sector.

Duties: Shall provide technical assistance to public & private entities to achieve ghg emission reductions, comply w/ local & state energy efficiency & electrification requirements.

Building Energy Transition Implementation Task Force

Duties: 1) study & make recommendations for complementary pgms, policies, & incentives aimed at reducing ghg emissions from building sector;(2) develop a plan for **funding** the retrofit of covered bldgs to comply w/ emission standards. Can include:

Community Solar Tax Incentives:

1. Personal property tax exemption for machinery used to generate electricity or steam for sale or hot or chilled water for sale to heat or cool buildings
2. Personal property tax exemption from county & municipal corp property tax that is part of a community solar energy generating system that has more than 51% for lmi households

EmPOWER

1. Extends EmPOWER
2. Goes from 2% to ramp up to 2.7%; ramp up begins in 2024; gets there in 2026 (calculated as a percentage of the normalized gross retail sales & electricity losses

Senate Bill 0528 is comprehensive legislation that must be passed with the following amendments to enable a sustainable future for Marylanders. Please vote in favor of SB 0528 with the attached priority amendments:

<u>Priority Amendments</u>

Building electrification and efficiency:

- **Climate Catalytic Capital Fund**
    - **Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.**
    - **The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".**
    - **Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels**
    - **Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.**
- **On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".**
- **On page 35, following line 9, add energy efficiency provisions for buildings. Add:**

D. For new covered buildings funded at least 25% by State funds

- **A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025**
- **A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027**

E. For all other new covered buildings

- **A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027**
- **A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation**

F. "Major Renovation" means a renovation project:

- **For which the total projected cost exceeds 50% of the assessed value of the existing building; or**
- **Involving a change of use, if the change involves the application of different requirements of the standards.**

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- **A 40% reduction in the building's average annual energy use; or**
- **A 20% reduction in modeled energy use consumption over the current Energy Code.**

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- **A 25–year period for all buildings funded at least 25% by the State.**
- **A 15–year period for all other buildings.**
- **Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030**
- **Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")**
- **The Building Emission Performance Standards regulations directive under 2-1602 (C) should**
    - **require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,**
    - **provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)**

Equity and Environmental Justice Provisions

- **Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.**

- **The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well**
- **The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning**

Net Zero Schools

- **Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.**
- **School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6**

(12-501(3)(I)(2)(A (under the provision requiring solar ready):

A. The Installation of Solar Energy Systems

- **To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:**
- **Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and**
- **Will be 20 stories or less in height, above grade plane.**

B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:

- **incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or**
- **shadow studies indicate that 25% of a building's roof area will be in shadow.**
- **Clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.**
- **Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -**
- **P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .**

Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

OR

- **Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.**
- **Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.**
- **Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.**

Buy Clean Maryland Act

- **Consider adding To SB528 the Buy Clean Maryland Act provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.**
    - **Section 4-904 (E) Strike - (4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.**
    - **Add - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.**

Thank you.
Nanci Wilkinson
Environmental Justice Ministry Team
Cedar Lane Unitarian Universalist Church

SB0528-FAV with Amendments-DTMG-2-15-22.pdf
Uploaded by: Olivia Bartlett
Position: FWA

Olivia Bartlett, DoTheMostGood Maryland Team

Committee: Education, Health and Environmental Affairs

Testimony on: SB0528 – Climate Solutions Now Act of 2022

Position: Favorable with Amendments

Hearing Date: February 15, 2022

Bill Contact: Senator Paul Pinsky

DoTheMostGood (DTMG) is a progressive grass-roots organization with more than 3000 members across all districts in Montgomery County as well as a number of nearby jurisdictions. DTMG supports legislation and activities that keep residents healthy and safe in a clean environment and which promote equity across all our diverse communities. DTMG strongly supports SB0528 because it directly addresses these fundamental goals by proposing an ambitious and necessary plan to reduce greenhouse gas (GHG) emissions and promote environmental justice across Maryland We also support several priority amendments to improve and strengthen SB0528 into the decisive forward-looking action Maryland needs.

Climate change due to global warming driven by man-made GHG emissions is already here. Maryland already has nuisance flooding, saltwater incursion on the Eastern Shore, high heat days, and storm surges on a regular basis. International experts have urged action on climate with increasing urgency in recent years for good reason: the consequences of not acting now will be very dangerous and very expensive for our children and grandchildren.

SB0528 is a comprehensive approach to reduce the GHG emissions that drive climate change, to move Maryland towards a clean renewable energy future with good green jobs, and to bring Maryland's plans for addressing the existential threat of climate change into line with the scientific recommendations of the most recent Intergovernmental Panel on Climate Change (IGPCC). SB0528 will update Maryland's GHG reduction goals to 60% reduction by 2030 and net zero emissions by 2045, and mandate that Maryland's Department of the Environment (MDE) cannot use highway widening or unproven carbon capture and storage technologies when planning how to achieve these goals. This will bring Maryland into line with the most recent IGPCC recommendations. SB0528 also requires the state to take several other immediate steps to reduce emissions, including transitioning state light vehicle fleet to zero-emission vehicles, reducing GHG emissions from buildings, and requiring better monitoring of methane leakage from landfills.

Many studies have shown that low-income and minority communities disproportionately bear the consequences of air pollution and climate change. Importantly, SB0528 focuses on equity and includes a role for black and brown communities, labor, and youth in shaping the implementation plans and achieving the goals of the legislation. First, SB0528 tasks the existing Maryland Commission on Environmental Justice and Sustainable Communities to solicit input from all segments and communities

in developing strategies to address the priorities of environmental justice communities, and to reduce greenhouse gas emissions and co-pollutants in the communities that have a disproportionate concentration of polluting industries and highways. The commission will also coordinate with vulnerable communities that are particularly challenged by storm surges, heat islands, lack of tree canopy, and other effects attributable to climate change and to coordinate with and report to the Maryland Commission on Climate Change and the MDE. Furthermore, SB0528 establishes a Just Transition and Retraining Work Group, composed of representatives of labor, the NAACP, and formerly incarcerated individuals, as well as registered apprenticeship sponsors, and representatives of the solar and wind industries to assist in a just transition.

Additionally, SB0528 creates a Climate Justice Corps composed principally of young people to create career training opportunities in the new green economy, particularly for youth from disadvantaged communities. However, we agree with Sunrise that the Corps should also provide good jobs, with good pay and good health benefits so that individuals from disadvantaged communities can truly take advantage of the career training opportunities in the program. In this regard, we recommend coordinating with Senate President Ferguson who sponsored SB0228 to amend the current Maryland Corps program and that has the opposite problem – it provides good jobs but does not provide career development opportunities in the developing green economy.

Because buildings produce 40% of Maryland's GHG emissions and account for 90% of Maryland's electricity consumption, plans to combat climate change must address improving energy efficiency in both new and existing buildings. Therefore, SB0528 includes timelines to require new commercial buildings and schools to be net neutral or solar ready. In particular, the bill requires adoption of an all electric construction code for water and space heating and adoption of the International Green Construction Code. The Building Emissions Standards proposed in SB0528 will require commercial and multifamily buildings that are 25,000 square feet or larger to reduce their greenhouse gas emissions 100% by 2040, with interim targets, and require public buildings to reach that target by 2035. SB0528 also includes a number of smart complementary components that will make the program work for the public, including:

- The Climate Transition & Clean Energy Hub which will act as a clearinghouse for information, technical advice and financial incentives for the public and professionals;
- The Climate Catalytic Capital Fund to provide the MCEC (Maryland's Green Bank) financing that includes C-Pace financing and creation of a green bonds program. These aspects allow financing to attach to the building itself, which is important for private owners, and the green bond fund will help to attract private capital to further enhance the utility of the fund. Depending on the program, every $1 of public investment in green bank funding generates $4 to $7 of private capital.
- The Building Energy Transition Implementation Task Force- to develop recommendations for further complementary programs and incentives aimed at reducing greenhouse gas emissions from the building sector; and
- The expansion of the EMPOWER program that will expand and increase rebates and other energy efficiency measures for consumers.

These provisions will position new buildings in Maryland to reduce their greenhouse gas emissions by not relying on fossil fuels and to focus on sustainable building materials and other sustainability measures.

However, it is equally critical to increase the *energy efficiency* of our buildings. One key reason buildings constitute 40% of Maryland's greenhouse gas emissions is because of their outsize draw on the grid, which is not yet clean. Also, as we transition to a fossil free economy, we need to reduce the

buildings sector's draw on the grid in order to maintain the integrity of the grid. We therefore urge that SB0528 require an energy use reduction pathway.

Furthermore, SB0528 is more conservative than it needs to be with respect to schools by proposing only a pilot program for net-zero schools. We already know that the upfront construction costs of net-zero and net-zero ready schools are comparable to the costs of conventional schools, as proven by the two net-zero schools in Baltimore. Those schools were built at a cost of $358 and $364 (including the solar panels) per square foot with site preparation, compared to $360 per square foot for conventional schools in that same year of construction. Importantly, the net-zero schools will have substantially lower operating costs because they will consume substantially less energy. These energy savings are all the more important when you consider that the MCCC has projected that gas delivery charges will increase 2 to 5-fold over current rates by 2045. Finally, by using the zero energy buses that are another aspect of SB528 as battery backup (as is being developed in Montgomery County), schools can act to reduce their draw on the grid further (or even to provide additional energy to the grid) and serve to strengthen our schools' ability to act as important resiliency hubs in times of emergency. At a minimum, schools should be required to be net-zero *ready* so they can add solar panels at a later date.

For these reasons, we strongly support SB0528 and endorse the priority amendments coordinated by the Maryland Climate Partners (listed below) and urge a favorable vote on SB528.

Respectfully submitted,

Olivia Bartlett
Co-lead, DoTheMostGood Maryland Team
oliviabartlett@verizon.net
240-751-5599

Amendments coordinated by the Maryland Climate Partners

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
  - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
  - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
  - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
  - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protections against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)
- **Under 12-1602 (C) of thePublic Safety Code, add: Energy Conservation**

  Insert:

  For new covered buildings funded at least 25% by State funds

  A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023.

  A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.

  For all other new covered buildings.

  A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.

  A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2027.

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language (attached).
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools/Net-Zero Ready Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report the status of meeting the high performance building requirements.
- P. 8, line 9-13:.
- Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

  OR
- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

<u>Technical Amendments</u>

- The term "Disproportionately affected communities should be replaced with "overburdened communities."
    - The definition of communities that are overburdened needs to include factors beyond climate change indicators.
        - At a minimum, an overburdened community includes any census block group… in which: (1) at least 45 percent of the households qualify as low-income households (defined as a household that is "at or below 200 percent of the federal poverty guidelines"), (2) at least 50 percent of the residents identify as non-white; OR (3) at least 25 percent of the households have limited English proficiency
- Specific to the establishment of goals for the percentage of state funding for GHG emissions reduction measures (page 10 lines 21-24 and page 11 lines 8-11):
    - Explicitly define GHG emissions reduction measures broadly (e.g.: Does it include adaptation measures such as tree planting? Building improvements? etc.)

Schools

- Delete "subject to the availability of funding" on page 8 line 14
- Fund Oversight committee of the Climate Catalytic Capital Fund should include representatives from overburdened communities and affordable housing communities.

On landfill methane

- subsection 2-408 (page 12), Amend the deadline for adoption of regulations January 2023 or June 2023.

State Fleet Electrification

- On page 42, in line 14, delete "subject to the availability of funding"

Climate Transition and Clean Energy Hub

- Include requirements for a user-friendly website and dashboard for keeping track of the hub's progress and findings. (pg. 45)

Building Performance Standards

- Designated Affordable housing needs flexible timeline to align with their scheduled recapitalization and refinancing timelines
- Include a representative of the low income, renter, tenants housing community, and an ESCO rep on the Building Energy Transition Implementation Task Force (page 49)
- Edit language for the Building Energy Transition Task Force charge in section (F) (1) to include reduction of direct emissions from the building sector (pg. 51)
- Edit language for the Building Energy Transition Task Force charge in section (F) (2) to ensure the Plan may include recommendations related to aligning and maximizing federal health, safety, weatherization, energy affordability, and electrification resources and programs, and education

programs for contractors and installation technicians focused on building electrification solutions (pg. 51)
- Enabling provisions should be added to allow local jurisdictions to establish more stringent energy efficiency and conservation standards for both major renovations and new construction.
    - Major renovations: include requirement for 40% reduction in covered building's energy use (or 20% reduction beyond current energy code) for major renovations. Suggested bill language for this, and definition of major renovations, in this doc.

Regarding Just Transition Employment Working Group

- Membership of the working group, on pg. 18, lines 5-6 strike "one representative of the Maryland Chapter of the Siera club, selected by the Maryland Chapter of the Sierra Club" and replace with "Two representatives of the environmental community"
- On page 20, line 7, strike "counter" and substitute "address".
- Fenceline communities should be defined (page 20, line 16)

Regarding school bus electrification

- When referring to the "cost difference between purchasing and operating" on Page 22 line 26, clarify that this includes "purchasing, deploying (infrastructure), administrative and operating costs, including retraining personnel."

Concerning the Climate Justice Corp

- The Climate Justice Corps Board should include 3 Representatives of the communities the program is trying to work in (page 26)
- On page 27 line 16-17 it should be stated that the meetings should rotate and be hosted within the communities the Corp Program aims at benefiting.

<u>Appropriations and timeline</u>

- Increase appropriations to the Climate Catalytic Capital Fund to $10 million a year and extend through FY2028
- For net-zero schools (pg. 9-10), Increase individual grants to a ceiling of $5 million, extend the program until 2034, and increase the annual appropriation to $20 million.
- Consider appropriations to MDE's air department to support the landfill methane work outlined on page 12
- Climate Transition and Clean Energy Hub should have an annual appropriation of $1.5 million to fund the hub (pg. 45)

<u>Aligning CSNA with complementary bills</u>

EMPOWER:

Whether in SB528 (pg. 36-37) or in complementary legislation, we support making revisions to the EMPOWER program to better align with our climate goals and energy needs. We are agnostic to the legislative vehicle for these changes but acknowledge the urgency due to the 2023 sunset of EMPOWER without legislative action. Reform should include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions
- Modifying Empower to focus on electrification and prohibit use of Empower support for new fossil fuel. (simply copy HB708, pg 24, lines 5-20)
    - "Article – Public Utilities 5 7–211. 6 (d) (1) Subject TO PARAGRAPH (2) OF THIS SUBSECTION AND SUBJECT to 7 review and approval by the Commission, each gas

company and electric company shall 8 develop and implement programs and services to encourage and promote the efficient use 9 and conservation of energy by consumers, gas companies, and electric companies. 10 (2) BEGINNING WITH THE CALENDAR YEAR 2024, THE PROGRAMS 11 AND SERVICES PROVIDED UNDER THIS SUBSECTION SHALL: 12 (I) ENCOURAGE AND PROMOTE THE REPLACEMENT OR 13 ENHANCEMENT OF GAS, OIL, OR PROPANE HEATING SYSTEMS WITH ELECTRIC HEAT 14 PUMPS, GIVING PRIORITY TO LOW–INCOME HOUSEHOLDS AND CONSUMERS; AND 15 (II) ENCOURAGE AND PROMOTE BENEFICIAL ELECTRIFICATION 16 FOR THE PURPOSES OF REDUCING ENERGY CONSUMPTION, REDUCING CONSUMER 17 COSTS, AND REDUCING GREENHOUSE GAS EMISSIONS. 18 (3) BEGINNING WITH THE CALENDAR YEAR 2024, THE PROGRAMS 19 AND SERVICES PROVIDED UNDER THIS SUBSECTION MAY NOT PROVIDE FINANCIAL 20 ASSISTANCE FOR EQUIPMENT OR APPLIANCES THAT USE FOSSIL FUEL.

- Modify acceptable use of SEIF.
    - See page HB708, pg 27, which modifies Public Utility Article 9–20B–05. The bill makes all SEIF funding subject to the following provisions (pg 29)
        - *11 (F–5) FUNDING PROVIDED UNDER SUBSECTION (F) OF THIS SECTION MAY BE 12 USED FOR A PROJECT THAT USES FOSSIL FUEL ONLY IF IT CAN BE DEMONSTRATED 13 THAT THE LIFECYCLE GREENHOUSE GAS EMISSIONS FOR THE PROJECT ARE LESS 14 THAN AN ALL–ELECTRIC ALTERNATIVE."*

Climate Justice Corps:

Climate Solutions Now and Comprehensive Climate Solutions have excellent criteria for climate mitigation and climate justice projects to build the decade of the Green New Deal, but they do not guarantee good pay and wages - which would exclude folks who need the jobs the most, black and brown and working class communities. The other proposal, Maryland Corps' Climate Corps program, funds good paying jobs with good benefits, but funds parks staffing shortages instead of climate mitigation and climate justice. Neither of these policies measure up to what the climate crisis and economic and racial justice demand.

To ensure that SB528 and SB228 work together and meet the needs of the environmental justice movement, we request that Senator Pinsky and President Ferguson align their bills to create a program (in either vehicle) that promotes climate projects with well paid/benefitted jobs. (Suggested amendment language below).

<u>Unanswered questions</u>

- Page 21, line 16-28, Should the IAC be added to be required to report annually in addition to state agencies?

<u>Potential Amendment Language</u>

On schools:

- SB 528 Page 38, line 10-18, adds an "AND" to the definition of "High Performance" which requires all State-funded projects to be zero energy. And Page 8, line 9-18, excludes schools from this requirement (except for 1 school to be zero energy in each district by 2033.) There are 2 possible paths for suggested amendments and this is probably best with a conversation.
    - One suggestion to simplify would be to remove both of these sections, and require energy efficiency targets as noted above for all State buildings, and all buildings with 25% funding on a path to zero energy ready.

- If Zero Energy stays in the High Performance definition section requiring state buildings to be zero energy now, then the energy efficiency targets as noted above could be revised to be for Public Schools and Community Colleges.

On Climate Justice Corps:

- Replace stipend criteria in CSNA with the more robust benefits guaranteed to corps members such as **$15/hr *minimum wage, health insurance, wraparound services & education support* $6000 education bonus exactly as they appear in MD Corps (SB228)**.
- Remove pg 29 line 25 - 29
- Replace in whatever format is legally or procedurally preferably so that the overseeing Board adopt regulations conforming to provisions from Maryland Corps (SB228) 24-1105 (B) sections 3 - 10
  - (3) PRIORITIZING THE PLACEMENT OF PROGRAM PARTICIPANTS WITH LARGE–SCALE EMPLOYERS BASED ON THE ORGANIZATION'S DEMONSTRATED NEED FOR PROGRAM PARTICIPANTS WHO WILL TRANSITION TO FULL–TIME EMPLOYMENT FOLLOWING COMPLETION OF THE PROGRAM;
  - (4) A CENTRALIZED PROCESS TO FACILITATE EFFICIENT SCREENING AND PLACEMENT OF PROGRAM PARTICIPANTS AS WELL AS EFFECTIVE MEASUREMENT AND EVALUATION OF THE PARTICIPANT'S SERVICE EXPERIENCE;
  - (5) STIPENDS FOR PARTICIPANTS, INCLUDING:
    (I) MONETARY PAYMENT OF AT LEAST $15 PER HOUR, HEALTH INSURANCE BENEFITS, AND THE POTENTIAL FOR WRAPAROUND SERVICES; AND
  - (II) FUNDS MATCHING REQUIREMENTS FOR LARGE–SCALE EMPLOYERS;
  - (6) AN EDUCATION AWARD OF $6,000 FOR PARTICIPANTS THAT COMPLETE AT LEAST 9 MONTHS OF SERVICE, WHICH SHALL BE DEPOSITED INTO A
    TAX–EXEMPT MARYLAND 529 ACCOUNT ESTABLISHED UNDER TITLE 18, SUBTITLE 19 OF THIS ARTICLE AND MAY ONLY BE USED FOR QUALIFIED HIGHER EDUCATION EXPENSES, AS DEFINED IN § 18–1901 OF THIS ARTICLE;
  - (7) WORKFORCE DEVELOPMENT TRAINING AND WRAPAROUND SERVICES PROVIDED TO PROGRAM PARTICIPANTS BY PARTICIPATING HOUSE BILL ORGANIZATIONS;
  - (8) ADDITIONAL TRAINING AND SUPPORT SERVICES PROVIDED TO PROGRAM PARTICIPANTS AFTER THE COMPLETION OF THE PARTICIPANT'S SERVICE;
  - (9) ONGOING EVALUATION OF OPPORTUNITIES TO EXPAND SERVICE IN THE STATE TO ADDRESS THE STATE'S WORKFORCE DEVELOPMENT NEEDS, INCLUDING OPPORTUNITIES WITHIN STATE AGENCIES FOR THE CREATION AND EXPANSION OF SERVICE OPPORTUNITIES WITHIN THE AGENCIES; AND
  - (10) ONGOING EVALUATION OF THE PROGRAM TO ENSURE ACCESS AND EFFECTIVENESS, INCLUDING:
    (I) DEMOGRAPHICS OF CORPS PARTICIPANTS, INCLUDING RACE, ETHNICITY, AGE, EDUCATION, AND GEOGRAPHY; AND
    (II) POST–PROGRAM TRAJECTORIES OF CORPS PARTICIPANTS

- Corps members should have the right to organize for collective bargaining and the right to strike, and should be protected from being discharged, disciplined, or permanently replaced for striking.
- Consider removing the age range of corps members and prioritizing applicants under 35 years old.

SB 528_ddagan_fav with amendments.pdf
Uploaded by: Paul Rozenberg
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February 11, 2022

VIA ELECTRONIC SUBMISSION
Senator Paul Pinsky
Chair, Senate Education, Health, and Environmental Affairs Committee
Maryland General Assembly
2 West
Miller Senate Office Building
Annapolis, Maryland 21401

RE: Senate Bill 528

Dear Chairman Pinsky:

Suburban Propane Partners, L.P. ("Suburban Propane") writes in regards to Senate Bill 528, which directs the State to achieve net-zero emissions by 2045. The bill proceeds to enact several methods to achieve this goal, two of which are concerning: 1) requiring the state Department of Labor to adopt building standards mandating new buildings meet all water and space heating demand without the use of fossil fuels and are electric-ready; and 2) requiring that all passenger cars and light-duty vehicles in the State vehicle fleet be zero-emission starting FY 2027 and FY 2033 respectively. Suburban Propane has been serving customers for 94 years and is the nation's third-largest propane retailer with operations in 42 states. In Maryland, Suburban Propane distributes propane to more than 55,000 customers, and we employ 158 people at 18 locations.

Suburban Propane supports the legislation's goal of achieving net-zero greenhouse gas emissions. However, requiring electricity over all other available energy sources does not achieve these goals. In fact, requiring electricity over traditional propane, renewable propane, and renewable dimethyl ether ("rDME") will lead to an increase in greenhouse gas emissions in the State because electricity is not the energy source with the lowest carbon intensity. Therefore, we ask the Committee to amend the bill to promote a technology-neutral approach encouraging the adoption of the lowest carbon intensity energy source to achieve the State's goal of reducing greenhouse gas emissions.

As currently drafted, Senate Bill 528 prioritizes electricity under the inaccurate assumption that electricity is the energy source with the lowest carbon intensity. Mandating that all new buildings and State vehicles use only electricity ignores readily available lower-carbon and carbon-negative energy sources that can accelerate Maryland's path towards net-zero emissions. Using data from the U.S. Energy Information Administration and the procedure employed by the California Air Resources Board ("CARB") to calculate emissions from electricity generation, the carbon intensity ("CI") score of Maryland's electric grid is 112.9.[1] Meanwhile, CARB has calculated the CI score of traditional propane to be 83.19, and renewable propane has a range of CI scores from 43.5 and 20.5, making both fuels substantially less carbon intensive than grid electricity.[2] The carbon intensity of rDME has not yet been established, but our analysis indicates that the CI score could be negative. Requiring only electric energy will not achieve the State's goal of reaching net-zero emissions because it requires the use of an energy source that has a higher carbon intensity then other readily available energy sources.

We encourage the Committee to focus on driving down greenhouse gas emissions by taking a technology-neutral approach that requires low carbon and carbon negative energy sources. The General Assembly should develop and enact legislation to establish a clean fuel standard for building emissions, similar to low carbon fuel programs for transportation in California, Oregon, and Washington. The regulatory framework and technical details of establishing a CI score are well tested and have led to a 10.9 percent reduction in transportation sector emissions from 2006 in California alone.[3]

We urge the Committee to amend Senate Bill 528 by adopting a technology-neutral approach that requires that new buildings and vehicles use low-carbon, carbon-neutral, or carbon-negative energy sources. We would appreciate the opportunity to discuss with you how such energy sources can play a role in lowering Maryland's carbon footprint. Thank you for your consideration.

Sincerely,

/s/ M. Douglas Dagan

M. Douglas Dagan
Vice President, Strategic Initiatives – Renewable Energy
Suburban Propane Partners, L.P.

[1] See https://propane.com/research-development/emissions/decarbonization-of-md-hd-vehicles-with-propane/ (accessed February 10, 2022)
[2] See https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities (accessed February 10, 2022)
[3] See https://ww2.arb.ca.gov/applications/greenhouse-gas-emission-inventory-0 (accessed February 10, 2022)

Prince George's Co Exec- SUP with Amd - Bill 528.p
Uploaded by: Prince George's County Maryland
Position: FWA

THE PRINCE GEORGE'S COUNTY GOVERNMENT

OFFICE OF THE COUNTY EXECUTIVE

BILL:	**Senate Bill 528 - Climate Solutions Now Act of 2022**
SPONSOR:	**Senator Pinsky, et al.**
HEARING DATE:	**February 15, 2022**
COMMITTEE:	**Education, Health, and Environmental Affairs**
CONTACT:	**Intergovernmental Affairs Office, 301-780-8411**

POSITION: **SUPPORT WITH AMENDMENTS**

The Office of the Prince George's County Executive **SUPPORTS WITH AMENDMENTS SB 528**, **Climate Solutions Now Act of 2022** which updates the broad Climate goals of the State from a 40% reduction in greenhouse gas (GHG) emissions by 2030 (2006 baseline) to a 60% reduction and net-zero emissions by 2045. In addition, it creates a variety of requirements for workforce development, procurement and building standards to work towards that goal, with focuses on environmental justice and low-income opportunities.

Prince George's County recently released a Climate Action Plan, reflecting our appreciation of the urgency of the Climate Crisis, and the need to identify solutions. The overarching goals of the Climate Solutions Now Act align with our own, and we are eager to support many of the diverse solutions offered. The County leads the state in waste diversion programming, community solar adoption and other GHG reduction efforts. We have begun a concerted effort to educate residents about community resilience and climate mitigation and adaptation needs. We are excited to support the State of Maryland in being a leader on Climate Solutions.

The County is extremely supportive of the State's efforts to address inequities and target solutions to the communities most affected by environmental injustice. New programs, like the Climate Catalytic Capital Fund provide flexible sources of funding to enable innovative solutions. The Climate Justice Corps combines best practices from tried-and-true programs, like AmeriCorps and JobCorps, and targets the needs of people most vulnerable to the increasing impacts of Climate Change- while working to build inclusive resilient communities from the ground up. Improvements to the Environmental Justice and Sustainable Communities Task Force and creation of the Just Transition and Retraining Working Group aim to bring experts together to offer their expertise to State and Local bodies- empowering Maryland to stay on the cutting

edge, be inclusive in its policymaking, and build the economy and workforce of the future. Further, the efforts to lead by example, including the electrification of the state fleet, and state buildings provide a testing ground for the use of new technologies, and the scaling of solutions.

However, to strengthen this bill, the Prince Georges County Executive's Office recommends the following amendments:

Funding Sources for Critical Climate Measures
The Climate Crisis requires an urgent response at all levels of government. It is imperative to meet the GHG reductions needed to avert the worst effects of climate change and build communities that are resilient enough to withstand the inevitable increased impacts- including severe storms, extended droughts, and health effects. However, the costs of making these changes through every part of our communities cannot rely solely on the residential property taxes, the primary source of revenue for most of our County governments. The State should make funding available at the scale to support these efforts. The costs of the improvements in this bill to our County government as written is at a scale of hundreds-of-millions of dollars. An increased commitment to focusing State funding to achieve these reductions and the collaborative development of alternative financing and funding mechanisms is required to achieve this urgent and necessary goal together.

Inclusion on Environmental Justice, Transition & Retraining Task Forces
Prince George's County is among nation's wealthiest majority African American communities, and yet has the lowest average income in the DC metro area and has both urban and rural census tracts with environmental justice equity challenges. According to the University of Maryland's EJ Screen Tool, most of the census tracts with the most significant environmental injustices are in Prince George's County, Baltimore County and Baltimore City. Thus, we recommend Prince George's County, Baltimore County and Baltimore City be included in the (1) Environmental Justice and Sustainable Communities, (2) Building Energy Transition Implementation and the (3) Just Transition and Retraining Working Group Task Forces.

Electric School Buses
Expand the cost measures for electric buses to include not only the buses themselves, but the costs of development and maintenance of the infrastructure to charge, maintain and operate them.

Landfill Methane Emissions
Create a methane emission working group, consisting of experts in the field, and County representatives with expertise operating the landfills across the state, in place of a proscriptive standard for airplane data observations. The work group should develop a data protocol and methodology for ground, airplane, and other methane observations. Such work group should also develop recommended improvements to the current methane emissions standards for landfills, including

municipal solid waste landfills, construction and demolition landfills and other regulated landfills.

The landfill regulations as described focus on the waste already in the landfill, rather than the need to divert methane-producing food and organic wastes going forward. Retroactively requiring the installation of landfill capture technology, without any cost-benefit analysis of the actual ability of those measures to offset methane emissions is a poor use of limited funding that could be used to divert waste and prevent future emissions. While the California standards are one metric to consider in developing Maryland's emissions regulations, the delta between what landfill operators are currently doing, and any proposed standard requires study and analysis.

The Bill as written represents approximately a 285-million-dollar investment in capture technology at just one landfill, without sufficient analysis to determine if that technology is going to produce any significant reduction in emissions. The County recommends a balanced approach- both appreciating the urgency of the Climate Crisis, while taking the time to make the most impactful decisions with limited resources.

Building Performance

The County has joined the White House's Building Performance Standard's working group and is committed to improving the energy efficiency of public, commercial and multifamily buildings. However, adopting a code is a challenging process, and the 2018 International Green Construction Code is a complex code designed to be an optional code with alternative compliance mechanisms. The timeline for adoption does not allow time to evaluate the successes and challenges experienced by Baltimore and Montgomery Counties, who have each adopted heavily amended versions of the code. An approach that will allow an inclusive, collaborative adoption of a voluntary code, and a progressive adoption of mandatory standards and alternative compliance pathways is recommended. Further, training and funding is needed to prepare the County government to adopt and enforce any new requirements, voluntary or mandatory.

For the reasons stated above, the Office of the Prince George's County Executive **SUPPORTS Senate Bill 528** and asks for a **FAVORABLE** report.

SB528-ClimateSolutionActof2022-EHEA-HoCoClimateAct
Uploaded by: Ruth White
Position: FWA

HoCoClimateAction.org
Howard County, Maryland

Testimony on SB528 - Climate Solutions Now Act of 2022

Hearing Date: February 15, 2022
Bill Sponsor: Senator Pinsky
Committee: Education, Health, and Environmental Affairs
Submitting: Ruth White for Howard County Climate Action
Position: Favorable with amendment

HoCo Climate Action -- a 350.org local chapter and a grassroots organization representing more than 1,450 subscribers, and a local chapter of the international organization 350.org -- supports SB528, Climate Solutions Now Act of 2022, with strengthening amendments (attached below).

We are in a time of climate crisis with many parts of our state barely above sea level, and experiencing continual local flooding. Even if the world meets the IPCC Paris Agreement, the University of Maryland's Center for Environmental Services estimates MD sea level rise of .8 to 1.6 ft. by 2050 and 1.2 to 3 ft. by 2100, and some estimates are higher. But we don't have to wait for 2050 or 2100 to see climate crisis results, we see extreme weather events already and we know that the cause is greenhouse gas (GHG) emissions. Here in Howard County, we have seen two deadly "thousand-year" flooding events in Ellicott City occur in the span of 2 years.

Our largest GHG emissions nationwide and in Maryland are buildings and transportation. The Climate Solutions Now Act of 2022 (SB528) is a strong bill which gives us a path forward to address reducing emissions in the transportation and buildings sectors as well as improving energy efficiency as we move to electrify everything.

Transportation is important. We support the SB528 time-specific goals to transition school buses, state vehicles and large trucks to electric and other important transportation bills.

Our group in Howard County is particularly excited about supporting the buildings provisions in SB528. We closely followed the work of the Maryland Commission on Climate Change's Building Transition Report (here and here) and are delighted that their findings and recommendations are reflected in this bill.

Since buildings emit 40% of Maryland's greenhouse gases (13% of which are direct emissions) and account for 90% of Maryland's electricity use, improving building energy performance and transitioning buildings off of fossil fuels is crucial to reaching Maryland's climate commitments. Although this bill is very strong, we join with the Climate Platform partners in recommending amendments to make it even better. See the suggested amendments below.

HoCo Climate Action has additional suggested improvements to building electrification provisions. The bill requires electrification of space and water heating for new construction. However, the current provisions allow for gas stoves/cooktops which are responsible for a high degree of indoor air pollution and illness, especially if the space is not well ventilated. See RMI article here. The bill should mandate that building codes require venting to the outdoors. In addition, if gas stoves are installed in new buildings, builders should be required to

also install electrical outlets designed for electric and induction stoves, to provide choice in the future when appliances are replaced.

We share the concern of the National Housing Trust and others that electrification of new buildings and changes to existing building codes do not unduly burden low income and make housing less or unaffordable for vulnerable populations. So we endorse consideration of the testimony of the National Housing Trust here and the effort to find reasonable flexibility to assure housing remains affordable,

We encourage a FAVORABLE report for this important legislation with the strengthening amendments above and below.

HoCo Climate Action
HoCoClimateAction@gmail.com -
Submitted by Ruth White, Steering and Advocacy Committee, Columbia MD
www.HoCoClimateAction.org

AMENDMENTS

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low- and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include “Facilitate the electrification of the building sector”.
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike “water and space heating” and substitute “on-site energy” and add on line 3, “except for kitchen appliances”.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:

  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

  F. “Major Renovation” means a renovation project:
    - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
    - Involving a change of use, if the change involves the application of different requirements of the standards.

  G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:
    - A 40% reduction in the building’s average annual energy use; or
    - A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
    - A 25–year period for all buildings funded at least 25% by the State.
    - A 15–year period for all other buildings.
- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero should be net-zero ready Insert on Page 35, following line 6 (12-501(3)(I)(2)(A (under the provision requiring solar ready):
    A. The Installation of Solar Energy Systems
        - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
        - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
        - Will be 20 stories or less in height, above grade plane.
    B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
        - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
        - shadow studies indicate that 25% of a building's roof area will be in shadow.
        - Clarify the definition of "Solar Ready" to include the 40% roof set aside and the necessary electrical panel and conduit requirements.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

OR

- Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.

- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
    - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
    - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

SB 528 Climate Solutions Now- Senate.pdf
Uploaded by: Ryan Fredriksson
Position: FWA

NATIONAL AQUARIUM®

Date: February 15, 2022
Bill: SB 528 Climate Solutions Now Act of 2022
Position: Favorable with Amendments

Dear Chair Pinsky and Members of the Committee:

The National Aquarium respectfully requests a favorable report with amendments for **SB 528 – Climate Solutions Now Act of 2022**, which sets necessarily ambitious climate goals and outlines a plan to achieve them.

Combatting climate change is one of the National Aquarium's three strategic conservation goals. We do this through a holistic, solutions-focused approach, which includes translating ocean and climate science, building resilience through community empowerment, implementing nature-based solutions, and reducing our own carbon footprint. We applaud the comprehensive approach of this critically necessary legislation. It is incumbent that governments at every level focus on reducing greenhouse gas emissions rapidly while prioritizing a just transition away from fossil fuels. We support this legislation because it promotes climate equity, centers environmental justice, and addresses the highest emitting sectors: transportation, energy consumption, and buildings.

The National Aquarium began reducing our carbon footprint more than a decade ago and is charting a course to reach net-zero across our buildings and operations. **We expect to meet or exceed the net-zero goal for covered buildings as outlined in the bill.** However, our ability to reach net-zero depends on the state meeting its greenhouse gas emissions reductions goals. If the state is unable to decarbonize its electricity sources on schedule, the Aquarium will have limited options to source enough clean energy and will likely incur additional costs and delays.

Based on our ongoing experience, we offer the following recommendations for amendments to the Building Emissions Standards to strengthen the legislation and support its effective implementation.

1. **Net greenhouse gas emissions should be explicitly defined to include Scope 1 (direct) *and* Scope 2 (indirect) emissions.**[1]

In pursuit of our net-zero goal, the Aquarium has completed a greenhouse gas emissions inventory study. Since 2010, the Aquarium has reduced its Scope 1 and Scope 2 greenhouse gas emissions by 29%. Reducing the Aquarium's direct, or Scope 1, emissions is a crucial part of our goal to reach net-zero. However, less than a quarter of the Aquarium's emissions are a result of Scope 1 emissions, mainly from natural gas boilers.

Currently, nearly two-thirds of the Aquarium's emissions come from the electricity supplied to the Aquarium (Scope 2 emissions). Scope 2 emissions are a major component of the overall greenhouse gas emissions for many buildings and should not be ignored. This approach is consistent with how other jurisdictions have approached emission reduction. For example, the

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[1] According to the U.S. EPA, Scope 1 emissions are direct emissions that occur from sources that are controlled or owned by an organization. Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling and are a result of an organization's energy use.

city of Boston's recently enacted Building Emissions Reduction and Disclosure Ordinance[2] includes Scope 2 indirect emissions into their calculation of greenhouse gas emissions.

Incorporating Scope 2 emissions into the definition of net greenhouse gas emissions also gives organizations the flexibility to reduce their overall emissions in a way that fits their unique circumstance. For example, organizations should not be penalized for prioritizing reductions in Scope 2 emissions, especially where reductions to Scope 1 emissions could take longer to achieve, require long term investments, and/or represent less of the organization's overall emissions. We urge the state to clarify that net greenhouse gas emissions includes both Scope 1 and Scope 2 emissions.

2. **Clarify that the emissions reductions targets are for all covered buildings on a collective basis, not individual buildings, and explicitly direct the Department to develop reasonable reduction targets by sector or building use.**

The state should make clear that the goal of the Building Emissions Standard is to reduce emissions of all covered buildings collectively by the targets outlined in the bill, not to reduce the emissions of individual buildings by the targets outlined in the bill. Additionally, this legislation should direct the Department of Environment to develop reasonable reduction targets by sector or building use. This approach is also consistent with Boston's Building Emissions Reduction and Disclosure Ordinance, which sets individual emission standards by 14 different building use types that are further broken down into different sectors.

If this bill is interpreted to require individual buildings to reduce emissions from their own baseline, it will penalize organizations who have already made significant progress in reducing their emissions and reward those who have not started yet.

The Aquarium strongly supports comprehensive climate solutions that focus on greenhouse gas emissions reductions. Our organization expects to meet or exceed the state's net-zero emissions goal. However, Maryland must carefully implement these goals in a way that does not penalize organizations and that understands each organization's journey may look different. **We urge the Committee to issue a favorable report with amendments on SB 528.**

Contact:
Ryan Fredriksson
Vice President, Government Affairs
410-385-8276
rfredriksson@aqua.org

[2] Ordinance Amending City of Boston Code, Ordinances, Chapter VII, Sections 7-2.1 and 7-2.2, Building Energy Reporting and Disclosure (BERDO 2.0). https://www.boston.gov/sites/default/files/file/2021/07/Docket%20%230775.PDF

Sunrise Maryland Climate Solutions Now Act.pdf
Uploaded by: Stephen Leas
Position: FWA

Committee: Education, Health and Environmental Affairs Committee
Testimony on: SB0528 Climate Solutions Now Act
Organization: Sunrise Movement Maryland
Submitting: Stephen J Leas
Position: Sunrise Baltimore Hub Representative
Hearing Date: February 15th

Dear Chairman Pinsky and Members of the Committee,

Thank you for considering our testimony. Sunrise Movement is a youth-led movement calling for sweeping legislation to fight the climate crisis and create good jobs in the process. Sunrise Movement Maryland is the coalition of our hubs and members across the state. We urge you to vote favorably for SB0528 - Climate Solutions Now Act with additional amendments.

The climate crisis is undoubtedly one of the greatest existential crises humanity has ever faced. Warming temperatures already severely impact disproportionately Black, brown and low income communities. Climate change is expected to burden young people with ecological devastation and increasingly insecure access to fundamental human rights such as clean water, air, and livable ecosystems. We must combat this crisis by rapidly reducing greenhouse gas emissions, increasing energy efficiency, and creating good paying, well benefitted jobs in renewable energy and climate justice projects, including through the creation of Climate Corps programs.

This bill takes important steps toward achieving these goals. We are especially excited for the creation of a Climate Justice Corps, as our movement has organized tirelessly to rally for Climate Corps programs. However, the Civilian Justice Corps as it is written is flawed because it does not guarantee good wages or benefits.

Truly just Maryland Climate Corps programs should have two features - create *good jobs* and the *right projects*. To meet criteria for *good jobs*, they should fund and attract funding for jobs that

guarantee a minimum stipend of $15 per hour and is thereafter tied to the state minimum wage, health insurance, wraparound services, and an education award of $6000. They should also identify the *right projects* in renewable energy and climate justice.

This bill sets a very good standard for the *right projects* criteria in green energy and climate justice projects in communities hit hardest by environmental and social injustices. However it does not meet the criteria for *good jobs*. The bill instead allows the overseeing Board to determine stipends based on the needs of the volunteer and the limits of budgetary appropriations. Unfortunately, without guaranteeing good pay and benefits, it will not deliver on the economic and racial justice goals of a Climate Corps. As written, it defeats the multifaceted purpose of a Climate Corps, which is to create good paying and well benefitted jobs primarily for young people in black, brown, and working class communities, competing with polluters' narrative power over good jobs, and creating an upward pressure on wages.

As currently written, the program would place climate justice projects in the same realm as unpaid/low paid internships, in which more privileged applicants who can afford to work for low pay and zero benefits will take the opportunity, while those who cannot afford to work without good pay and benefits will be excluded. It is important that the "Climate Justice Corps" not be a misnomer. Unfortunately, allowing marginalized Corps members to be underpaid and under insured as they commit to the necessary labor of repairing environmental injustice makes it so.

For these reasons we urge the Committee to ensure that the Climate Justice Corps program pay a minimum wage of $15 per hour and be tied to the state minimum wage thereafter. We also urge the committee to ensure that health insurance, wraparound services, and an educational award are provided to Corps members.

We suggest that the language regarding those provisions be consistent with language from Senate President Bill Ferguson's Maryland Corps, which also includes the creation of a Civilian Climate Corps program. It would be beneficial for both Senate President Bill Ferguson's Civilian Climate Corps and Climate Solutions Now Act's Climate Justice Corps to pass this session with mutually consistent language regarding wages, benefits and types of projects. This will ensure that two

Climate Corps programs will pass this session that create *good jobs* for the *right projects* and would make Maryland a national leader for Climate Corps programs.

In addition to those most urgent amendments, we also suggest three further amendments: The bill should guarantee the right for corps members to organize for collective bargaining and to strike. Second, political organizing should not be barred outside of working hours as green collar workers are likely to be vitally important to winning climate justice in political arenas. Finally, the bill should make any Climate Corps program open to all ages, but prioritize hiring young people, historically marginalized, and working class groups.

We encourage a FAVORABLE WITH AMENDMENTS Report for this important legislation.

Sincerely,

Sunrise Movement Maryland
- Sunrise Baltimore
- Sunrise Howard County
- Sunrise UMD
- Sunrise Silver Spring
- Sunrise UMBC
- Sunrise McDaniel
- Sunrise Frederick

Maryland Legislative Coalition
Cedar Lane Environmental Justice Ministry
Molly Perkins Hauck, Ph.D., Licensed Psychologist
MLC Climate Justice Wing
Takoma Park Mobilization Environment Committee
Unitarian Universalist Environmental Justice Ministry
Our Revolution, Howard County, MD
Friends of Saqib Ali
Strong Future Maryland
WISE
Climate Law & Policy Project
Progressive Maryland
Stream Team Prince George's County

Amendments

- Replace stipend criteria in CSNA with the more robust benefits guaranteed to corps members such **$15/hr *minimum wage, health insurance, wraparound services & education support* $6000 education bonus exactly as they appear in MD Corps (SB228)**.
- **Remove pg 29 line 25 - 29**
- **Replace in whatever format is legally or procedurally preferably so that the overseeing Board adopt policies to ensure good pay and benefits and criteria consistent with provisions from Maryland Corps (SB228) 24-1105 (B) sections 5 - 8, and (5) should also be amended to tie the minimum stipend of the Civilian Justice Corps to the state minimum wage hereafter:**
    - **(5) STIPENDS FOR PARTICIPANTS, INCLUDING:**

(I) MONETARY PAYMENT OF AT LEAST $15 PER HOUR , HEALTH INSURANCE BENEFITS, AND THE POTENTIAL FOR WRAPAROUND SERVICES; AND

- (6) AN EDUCATION AWARD OF $6,000 FOR PARTICIPANTS THAT COMPLETE AT LEAST 9 MONTHS OF SERVICE, WHICH SHALL BE DEPOSITED INTO A TAX–EXEMPT MARYLAND 529 ACCOUNT ESTABLISHED UNDER TITLE 18, SUBTITLE 19 OF THIS ARTICLE AND MAY ONLY BE USED FOR QUALIFIED HIGHER EDUCATION EXPENSES, AS DEFINED IN § 18–1901 OF [SB0228];
- (7) WORKFORCE DEVELOPMENT TRAINING AND WRAPAROUND SERVICES PROVIDED TO PROGRAM PARTICIPANTS BY PARTICIPATING.
- (8) ADDITIONAL TRAINING AND SUPPORT SERVICES PROVIDED TO PROGRAM PARTICIPANTS AFTER THE COMPLETION OF THE PARTICIPANT'S SERVICE;

- **The bill should define the "wraparound services" included in the program the same way that it is defined in SB0228 on page 3 (lines 18 - 25) through page 4 (lines 1 - 3) as follows**

(G) "WRAPAROUND SERVICES" INCLUDES:

(1) CHILD CARE;

(2) TRANSPORTATION;

(3) HOUSING;

(4) MENTAL HEALTH;

(5) CRISIS INTERVENTION;

(6) SUBSTANCE ABUSE PREVENTION OR TREATMENT;

(7) LEGAL AID;

(8) FINANCIAL LITERACY PROGRAMMING;

(9) JOB SEARCH AND APPLICATION SUPPORT; AND

(10) COLLEGE APPLICATION SUPPORT.

- **Corps members should have the right to organize for collective bargaining and the right to strike, and should be protected from being discharged, disciplined, or permanently replaced for striking.**
- **The provision barring political organizing should be removed.**
- **Remove the age range of corps members and prioritize applicants under 35 years old.**

SB 528_TNEDWICK_fav w amendments.pdf
Uploaded by: Todd Nedwick
Position: FWA

National Housing Trust
Testimony to the Senate Education, Health, and Environmental Affairs Committee
SB 528- the Climate Solutions Now Act of 2022
Position: FAVORABLE WITH AMENDMENTS
February 15, 2022

Submitted by:
Todd Nedwick
Senior Director of Sustainability Policy
National Housing Trust

National Housing Trust (NHT) is a non-profit that creates and preserves affordable homes to provide opportunity, advance racial equity, reduce economic disparities, and strengthen community resilience through practice and policy. As an affordable housing developer, NHT has preserved 450 affordable housing units in Maryland, including most recently Hamilton Manor in Hyattsville. As a policy advocate for sustainable affordable housing, NHT has been deeply engaged in the Building Energy Performance Standard (BEPS) policymaking process in Washington, D.C., including as a representative of affordable housing owners on the D.C. Building Energy Performance Standards Task Force.

This testimony is focused on the Building Emissions Standard in SB 528. NHT supports the Building Emissions Standard with amendments that would provide flexibility to ensure that affordable housing can comply with the performance standards.

The following organizations support the recommendations proposed in this testimony:

- **AIA Maryland**
- **American Council for an Energy-Efficient Economy**
- **Green and Healthy Homes Initiative**
- **Maryland Affordable Housing Coalition**
- **MLC Climate Justice Wing**
- **Natural Resources Defense Council**
- **Sierra Club**
- **Takoma Park Mobilization Environment Committee**

A building performance standard (BPS) is an important policy tool for accelerating decarbonization and delivering health and economic benefits to residents. Like any policy, BPS should be designed in a way that centers community priorities, provides direct benefits to under-resourced communities, and does not exacerbate existing inequities.[1]

BPS policies should not exempt affordable housing. Electrifying and improving the energy and water efficiency of multifamily buildings can preserve affordable housing by

[1] Building Performance Standards: A Framework for Equitable Policies to Address Existing Buildings, Prepared for the American Cities Challenge, July 2021.

lowering operating costs, reducing residents' energy bills, and creating healthier housing. However, affordable housing owners face several obstacles to improving the energy efficiency of their properties. Obstacles primarily relate to limited access to the funding and staff capacity required to undertake building upgrades. Therefore, it is essential that easily accessible funding and technical assistance be available to help affordable housing owners comply with the law. Complementary policies and programs and compliance flexibility are necessary to ensure that the costs of BPS are not passed through to tenants or force owners of under-resourced buildings to sell their buildings if they cannot comply with the law.

The Amendments presented below:

- provide flexibility to affordable housing owners by allowing for alternative compliance pathways,
- ensure that the Building Energy Transition Implementation Task Force includes a tenant representative and directs the Task Force to prioritize identifying policies and programs that provide tenant protections and funding for affordable housing, and
- create a role for the Task Force in advising the Department on the development of BPS regulations to ensure that input from community members is considered.

Proposed Amendments to SENATE BILL 528 Climate Solutions Now Act of 2022

Amendment #1:

- Pg, 47 under "Regulations adopted under this section shall:" add "Allow owners of covered buildings to submit an Alternative Compliance Action Plan to the Department if the building owner cannot meet the interim or final emissions standards by the required date or cannot meet the interim or final emissions standards due to economic infeasibility or other circumstances beyond the owner's control. The Plan shall include: (a) documentation of economic infeasibility or other circumstances beyond the owner's control such that the interim or final emissions standards cannot be met; (b) if applicable, new proposed interim or final emissions standard; (c) a list of actions the owner will take to achieve the proposed interim or final emissions standard; (d) the timeline for achieving the proposed interim or final emissions standard; and (e) other requirements determined by the Department.

  The criteria for evaluating an Alternative Compliance Action Plan submitted by owners of affordable housing shall include, at a minimum, whether: (a) there is a plan to refinance or recapitalize their property; or (b) there are cash flow constraints, including, but not limited to, restrictions on the usage of net cash flow, or prohibition from utilizing a portion of existing cash reserves for implementing improvements to the building that would reduce emissions."

Purpose of Amendment:

- Provides flexibility for building owners who face significant challenges to meeting compliance by proposing revised emissions standards and/or an adjusted timeline for meeting the emissions standard.
- Assures accountability by:
    - Requiring owners to document the reasons they cannot meet the emissions standard and/or timelines
    - Specifying the requirements that owners must meet when applying for an alternative compliance pathway and authorizing the administering agency to approve or deny the owner's proposed Plan.
- Specifies financial barriers unique to affordable housing that the Department must consider when evaluating a proposed alternative compliance action plan.

Why It's Important:

- A covered building may have specific circumstances such as financial distress, changing ownership, changing occupancy type, vacancy, demolition, or other events that may require adjustments to compliance requirements and timeline.
- Affordable housing faces unique financial challenges, such as an inability to take on new debt between recapitalizations, limited cash flow due to restricted rents, and restrictions on using reserves for building improvements in regulated housing.
- Alternative compliance may be used as a tool to chart custom compliance paths for buildings to match with their capital investment cycle and provide additional flexibility as needed while still requiring building owners to take action to reduce emissions.
- Building performance policies in Boston, Denver, DC, and St. Louis provide a process for building owners to request adjustments to the compliance timeline and/or performance target.

Amendment #2:

- Pg. 50, add to the Building Energy Transition Implementation Task Force: "One representative who is a tenant of an apartment building or is an advocate for the rights of tenants of apartment buildings."

Purpose of Amendment:

- Adds a tenant or tenant advocate to the Task Force

Why It's Important:

- Including a tenant representative can provide perspective on real-world constraints on achieving the policy's goal and can help target funding, supportive programs, and resources to those who need it most.

Amendment #3:

- Pg, 51, under "The Task Force Shall" add "Study the costs of complying with building emissions standards for different building types including, but not limited to, affordable housing."

Purpose of Amendment:

- Requires the Task Force to conduct a cost analysis for different building types and sizes.

Why It's Important:

- The Task Force members and other stakeholders will need cost information to weigh complementary policy and program design considerations and shape supportive programs.

Amendment #4:

- Pg. 51, under the "Task Force Shall" add "Study and make recommendations regarding the development of complementary programs and policies that protect renters from increased rents and energy burdens and risk of displacement."

Purpose of Amendment:

- Helps ensure that programs and policies will be in place to protect tenants from unintended consequences that perpetuate existing inequities.

Why It's Important:

- If upgrade costs or penalties/fines are passed through to renters, this could result in eviction and long-term displacement, especially in unregulated affordable housing where there is no restriction on how much the landlord can charge for rent.
- The potential cost of compliance could also lead building owners to sell their properties to new owners who may raze or upgrade the building, making it no longer affordable.

Amendment #5:

- Pg. 51, line 12, under the "Task Force Shall" add at the end of the sentence "that shall prioritize recommendations for funding the retrofit of affordable housing."

Purpose of Amendment:

- The bill requires the Task Force to develop a plan for funding retrofits of covered buildings. The amendment prioritizes developing funding recommendations for affordable housing.

Why It's Important:

- Funding and technical assistance for affordable housing are critical parts of an equitable building performance standard law.
- Affordable housing owners will struggle to meet performance standards without such assistance.
- Compliance costs could force building owners to sell or redevelop their buildings, resulting in the loss of affordable housing and displacement of renters.

Amendment #6:

- Pg. 51, under the "Task Force Shall" add: "Advise the Department on the creation of an implementation plan for the Emissions Standards Program; and Recommend amendments to proposed regulations issued by the Department."

Purpose of Amendment:

- Adds to the Task Force's responsibilities advising the Department on creating the rules to implement the policy.

Why It's Important:

- Ensures that key stakeholder perspectives are consulted as the regulations and implementation plan for the building emissions standard are developed.
- Helps the Department to understand the real-world constraints and impacts of the policy.

Amendment #7:

- Incorporate a definition of "Affordable Housing" by adding the following: "Affordable Multifamily Housing means buildings that are primarily residential, contain five or more dwelling units, and: (1) In which use restrictions or other covenants require that at least 50% of all of the building's dwelling units are occupied by households that have household incomes of less than or equal to

80% of the area median income; or (2) The building owner can demonstrate that at least 50% of the dwelling units rent at levels that are affordable to households with incomes less than or equal to 80% of the area median income."

Purpose of Amendment:

- Defines affordable housing for the purpose of qualifying for flexibility.

Why It's Important:

- Uses a definition that aligns with affordable housing programs make it easier for building owners that use those programs to prove affordability.
- Incorporates naturally occurring affordable housing and provides building owners two ways to qualify as affordable: based on tenant income or rent level -- referencing rent level makes it easier for owners of unsubsidized affordable housing to demonstrate affordability.
- Defines as affordable any building for which most of its units are affordable.

Thank you for considering these recommendations to improve SB528. If you have any questions about this testimony, please contact Todd Nedwick, Senior Director of Sustainability Policy, at tnedwick@nhtinc.org or 202-333-8931 ext. 128.

LS22, SB528, CCAN Venable, FWA.pdf
Uploaded by: Victoria Venable
Position: FWA

SB0528 - Climate Solutions Now Act of 2022

Date: February 15, 2022
Committee: Senate Education, Health, and Environmental Affairs Committee
Position: Favorable with amendments
Victoria Venable, Maryland Director - Chesapeake Climate Action Network Action Fund

On behalf of the Chesapeake Climate Action Network Action Fund, I urge a favorable report from the committee on **SB0528 - Climate Solutions Now Act of 2022.** While CCAN Action Fund strongly supports this bill, we offer several amendments to strengthen it.

The CCAN Action Fund is the advocacy arm of Chesapeake Climate Action Network, a grassroots organization dedicated exclusively to fighting for bold and just solutions to climate change in the Chesapeake region of Maryland, Virginia, and Washington, DC. The latest report from the Intergovernmental Panel on Climate Change, issued in August of 2021, has declared a "code red for humanity" due to rapidly worsening climate change. The report declared that nations have delayed curbing their fossil-fuel emissions for so long that they can no longer stop global warming from intensifying over the next 30 years. However, there is still a short window to prevent the most harrowing future. SB0528 meets this urgency with ambitious but achievable climate commitments and a comprehensive plan to reach them.

The Climate Solutions Now Act of 2022 addresses the top three emitting sectors –transportation, energy consumption, and buildings– while centering environmental justice concerns and promoting climate equity.

Environmental Justice and Climate Equity

Similar to the COVID 19 crisis and natural disasters, climate change does not impact communities equally. Systems of oppression have created sacrificial zones that are overburdened with multiple, overlapping environmental stressors and sources of pollution such as coal plants, landfills, and incinerators. Meanwhile, climate impacts, such as flooding, are felt hardest by low-lying neighborhoods which are disproportionately communities of color and low-income.

The Climate Solutions Now Act takes some initial steps to address these injustices and ensure that our climate solutions are targeted to the communities that need them the most. By establishing programs like the Climate Catalytic Capital Fund and the Climate Justice Corps, this bill aims to target investments such as projects to reduce greenhouse gas emissions or increase clean energy deployment to overburdened communities. Importantly, this bill also directs the Maryland Department of the Environment to work in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities to conduct research on cumulative impacts and overburdened communities. It also requires that MDE

establish strategies to address environmental justice and advance climate equity. This is a crucial step in understanding how to best serve our vulnerable communities.

Transportation

Our state's Greenhouse Gas Inventory indicates that transportation is the greatest contributor to climate pollution in the state, with gasoline and diesel-powered motor vehicles accounting for more than one-third of all greenhouse gas emissions in Maryland. To meet our greenhouse gas reduction goals, Maryland needs to transition as many vehicles to zero-emission vehicles as possible.

Additionally, vehicle tailpipe emissions create significant health hazards, particularly in communities near major highways and roadways. In fact, an academic study published in *Environmental Research Letters* in June of 2021 found that vehicle emissions (namely, ozone and fine particulate matter) led to an estimated 7,100 premature deaths in the mid-Atlantic and Northeast region in 2016 alone. This includes 664 deaths in Maryland.

It is crucial that the state lead by example and transition our state fleet to zero-emission vehicles (ZEV). Climate Solutions Now begins that process by requiring that a portion of the passenger cars and light-duty vehicles purchased for the state fleet be zero-emission vehicles (ZEV) starting in the fiscal year 2023. By 2033, 100% of all light-duty vehicles purchased by the state will be ZEV.

Buildings

A critical new addition to the Climate Solutions Now Act of 2022 is a focus on building electrification and emissions. In November of 2021, the Maryland Commission on Climate Change released its annual report and Building Energy Transition Plan, recommending the adoption of Building Emission Standards and an "all-electric new construction code." The Climate Solutions Now Act of 2022 introduces versions of both of these recommendations. While we believe that new construction should adhere to a true all-electric standard, we appreciate the introduction of an electric standard for water and space heating. Based on current trends, Maryland is on track to have 12% more residential gas customers in 10 years than today. In order to meaningfully reduce emissions from our building sector, we must not invest in new fossil fuel infrastructure. Electrifying our new buildings will help us shift this trend and decarbonize our buildings.

Building electrification is particularly important for residential buildings due to the cost and health benefits associated with shifting from gas to electric energy systems. According to Rewiring America, 99% of households in Maryland—2.2 million homes—could save money on energy bills if they converted an existing appliance to a high-efficiency electric appliance. Rewiring America also found that the average household in Maryland will save **$393 on their energy bills** by switching to modern, electric appliances.

The Maryland Department of the Environment worked with Energy + Environmental Economics (E3) to model the costs of construction of all-electric new buildings. E3's Maryland Buildings Decarbonization Study found that:

- For single-family homes, all-electric homes **cost less to construct** than new mixed-fuel homes.
- For multifamily buildings, all-electric **costs about the same to construct** as mixed-fuel buildings.

- At current utility rates, **annual energy costs are comparable** between homes with electric heat pumps and homes with gas furnaces. Gas rates are expected to increase this winter.
- **Annual energy costs are lower** for homes with electric heat pumps than homes heated by electric resistance, oil, or propane.
- As Maryland moves toward a net-zero-emissions goal, all-electric new buildings of any type—residential and commercial—will have the **lowest total annual costs** (including equipment, maintenance, and energy costs).

These cost savings are more relevant than ever, as fuel prices across the country continue to rise. The U.S. Energy Information Administration predicts that utility bills will continue to increase through this winter, largely due to the volatility of fossil fuel prices. Households with electric heat pumps will feel this impact significantly less than homes using natural gas, propane, or fuel oil. In fact, households using fracked gas for heat should expect to pay on average $161 more this winter compared to last year, and households using delivered fuels (propane and fuel oil) will see even greater increases ($582 and $524, respectively), while households with electric heat pumps can expect to pay only $21 more. Electrifying our homes can help provide Maryland families with more energy cost stability while helping reduce emissions.

Climate change is a complex and intersecting issue, which will require comprehensive and iterative solutions. With 3,000 miles of tidal shoreline, Maryland is one of the most climate-vulnerable states in America – just from sea-level rise. The Climate Solutions Now Act begins to tackle this problem. Alongside our strong support of this bill, we offer minor amendments attached. We believe that with the passage of a strong version of the Climate Solutions Now Act, we can put Maryland back on track as a leader in climate action.

Thank you for your consideration of SB0528, Climate Solutions Now. For all the reasons stated above, we urge a favorable vote from the committee.

CONTACT: Victoria Venable, Maryland Director
Victoria@chesapeakeclimate.org (301) 960-8824

Proposed Amendments

Chesapeake Climate Action Network Action Fund

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - Fund Oversight committee membership should include representatives from overburdened communities and affordable housing communities.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Page 8 as a new section (F) -- "The Fund may not be used for a project to install new equipment that uses fossil fuels or upgrades the efficiency of existing equipment that uses fossil fuels."
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:

  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

  F. "Major Renovation" means a renovation project:
        - For which the total projected cost exceeds 50% of the assessed value of the existing building; or
        - Involving a change of use, if the change involves the application of different requirements of the standards.

  G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:
        - A 40% reduction in the building's average annual energy use; or
        - A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:
    - A 25–year period for all buildings funded at least 25% by the State.
    - A 15–year period for all other buildings.
- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)
- Pg 51, lines 7-10 Edit language for the Building Energy Transition Task Force charge in section (F) (1) to read "STUDY AND MAKE RECOMMENDATIONS REGARDING THE DEVELOPMENT OF COMPLEMENTARY PROGRAMS, POLICIES, AND INCENTIVES AIMED AT REDUCING GREENHOUSE GAS EMISSIONS **AND DIRECT EMISSIONS** FROM THE BUILDING SECTOR IN ACCORDANCE WITH THIS SUBTITLE; AND"
- Edit language for the Building Energy Transition Task Force charge in section (F) (2) to ensure the Plan may include recommendations related to aligning and maximizing federal health, safety, weatherization, energy affordability, and electrification resources and programs.
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should 1) require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways, 2) provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments to go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider the climate in long-term planning

Just Transition Employment Working Group

- Page 18, line 6 - Regarding membership of the working group, do not explicitly mention a group, rather state that there will be *two* representatives from the environmental community

State Fleet Electrification: pages 48 - 51

- On page 42, in line 14, delete “subject to the availability of funding”

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.
- School buildings that are not net-zero energy should be net-zero energy ready.

Marylanders in Support of the Climate Solutions No

Uploaded by: Victoria Venable

Position: FWA

Marylanders in Support of the Climate Solutions Now Act of 2022

Dear Maryland House and Senate members,
We, the undersigned civic organizations, businesses, and elected officials urge you to immediately pass SB 528, the Climate Solutions Now Act of 2022. We ask you to pass a companion set of bills in the House, achieving the same climate, equity, and clean energy goals.

Those goals must include, without weakening:

1. A mandate to cut greenhouse gas emissions 60% by 2030 (below 2006 levels).
2. A requirement that all newly constructed buildings in Maryland have electric-only energy systems exempting only kitchen appliances.
3. Serious efforts to begin electrifying our transportation system starting with school buses and state-owned vehicles.
4. Robust climate investments in overburdened and low and moderate-income communities, including a Climate Justice Corps that will support clean energy projects and create jobs for young adults.
5. A Net Zero School Fund to assist local school systems in building net-zero schools.

The issue of justice, again, must be central. Following a proposed national standard, all efforts in Maryland to reduce harmful emissions must guarantee that at least 40% of climate investments and benefits accrue to disadvantaged communities. Communities of color in our state have historically suffered disproportionately from dirty energy and climate impacts. Our climate solutions must reach these communities first. The Climate Solutions Now Act, if passed without weakening amendments, will begin reversing these trends while taking concrete steps toward a carbon-free Maryland for all. Please pass it immediately.

Sincerely,

<u>Elected officials</u>
Mayor Jake Day, City of Salisbury
Councilwoman Christiana Rigby, Howard County Council, District 3
Chairwoman Lisa Rodvien, Anne Arundel County Council District 6
Council Member Sarah F. Lacey, Anne Arundel County Council District 1

<u>Organizations</u>
350MoCo
Alliance for Livable Communities
Audubon Naturalist Society
Audubon Society of Central MD
BALTIMORE Blue+Green+Just
Baltimore Tree Trust
Baltimore-Washington Conference of the United Methodist Church Creation Care Action & Advocacy

Bazaar
Blue Water Baltimore
BotaniCuisine, LLC
CASA
Cedar Lane Church Environmental Team
Cedar Lane Environmental Justice Ministry
Charmington's Cafe
Chesapeake Bay Foundation
Chesapeake Climate Action Network
Chesapeake Physicians for Social Responsibility
Clean Water Linganore, inc
Climate Law & Policy Project
Climate Reality Montgomery County
Climate Reality Project Baltimore
Creation Care Ministry of the DE-MD Synod
Downtown Residents Advocacy Network (Baltimore)
Elders Climate Action Maryland
Emmanuel United Methodist Church, Laurel
Environment Maryland
Environmental Justice Ministry Cedar Lane Unitarian Universalist Church
Episcopal Diocese of Md
Glen Echo Heights Mobilization
Greenbelt Climate Action Network
GRID Alternatives Mid-Atlantic
High Note Consulting, LLC
Howard County Climate Action
Indivisible Howard County
Interfaith Power & Light (DC.MD.NoVA)
Jewish Community Relations Council/Jewish Federation of Howard County
Ji'Aire's Workgroup Mental Health and Wellness
League of Women Voters Maryland
Maryland Campaign for Environmental Human Rights
Maryland Catholics for Our Common Home
Maryland League of Conservation Voters
Maryland Legislative Coalition
Maryland Ornithological Society
Maryland Public Health Association
Maryland Sierra Club
MaryPIRG Student Climate Action Coalition
Maxedoutsolar
MD Peace Action
Montgomery Countryside Alliance
Montgomery County Young Democrats
Mother Earth Project
Neighborhood Sun Benefit Corp
NeighborSpace of Baltimore County
Our Revolution, Howard County, MD
Prince George's County Young Democrats
Public Justice Center
Quaker Voice of Maryland
Rachel Carson Council
Rebuild Maryland Coalition
Rock Creek Conservancy
Safe Skies Maryland
Sandy Spring Meeting of the Religious Society of Friends
ShoreRivers
Solar Energy Industries Association
Stone house Collective LLC
Strong Future Maryland
Sunrise Movement Baltimore
Sunrise Movement Howard County
Takoma Park Mobilization Environment Committee
The Biz Center Renewable Energy Incubator
The Green Commuter
The Protest Chaplains of the Diocese of Maryland
The Wise Steward, Inc.
Transition Howard County
Unitarian Universalist Legislative Ministry of Maryland
Waterkeepers Chesapeake
WISE

SB528 - Climate Partners FWA.pdf
Uploaded by: Victoria Venable
Position: FWA

SB0528 - Climate Solutions Now Act of 2022

Date: February 15, 2022
Committee: Senate Education, Health, and Environmental Affairs Committee
Position: Favorable with amendments

The undersigned organizations express their strong support for **SB0528 - Climate Solutions Now Act of 2022** and thank the sponsor, Senator Pinsky, for introducing this important piece of legislation. We support this bill and offer several amendments that strengthen the legislation (attached).

Climate Solutions Now is a crucial piece of legislation that sets ambitious but achievable climate goals and outlines a plan to reach them. We support this legislation because it addresses the top three emitting sectors –transportation, energy consumption, and buildings– while centering environmental justice concerns and promoting climate equity.

Historically, low-income communities and people of color have borne disproportionate negative impacts from dirty energy use and climate change. Through the creation of a Climate Catalytic Capital Fund and a Climate Justice Corps, the Climate Solutions Now Act of 2022 aims to support projects to reduce GHG emissions in overburdened communities and invest in a "green-collar" workforce. We urge the sponsor to work with colleagues to collaborate with programs such as the Maryland Corps Program and the proposed Maryland Civilian Climate Corps (proposed in SB228) to ensure that the jobs created to promote climate justice and clean energy projects are well paid and benefitted.

Additionally, we strongly support the provisions that direct the Maryland Department of the Environment to conduct research and data gathering on cumulative impacts and overburdened communities, in consultation with the Maryland Commission on Environmental Justice and Sustainable Communities. It is important that these duties are properly staffed and lead to the establishment of strategies to address environmental justice and advance climate equity, including goals for funding directed to disproportionately affected communities. We offer minor amendments to improve this provision.

We believe that the state should be leading by example in electric vehicle adoption. Climate Solutions Now does exactly this by requiring that a portion of the passenger cars purchased for the state fleet be ZEV starting in the fiscal year 2023 and reaching 100% by 2027 and a portion of all light-duty vehicles purchased for the state fleet be ZEV starting in the fiscal year 2028 and reaching 100% by 2033.

Because buildings emit 40% of Maryland's greenhouse gases (13% of which are direct emissions) and account for 90% of Maryland's electricity use, improving building energy performance and

transitioning buildings off of fossil fuels is crucial to reaching Maryland's climate commitments. We strongly support these provisions in Climate Solutions Now and offer minor amendments to strengthen them.

Finally, we commend the bill sponsor for including provisions to extend the EmPOWER Maryland program and increase the annual efficiency gains. This program is a critical tool in mitigating the energy burden our most vulnerable residents face. However, we recognize an urgent need to better align this program with our climate goals. Whether in SB528 (pg. 36-37) or in complementary legislation, we support making revisions to the EMPOWER program to better support our climate goals and energy needs. We are agnostic to the legislative vehicle for these changes but acknowledge the urgency due to the 2023 sunset of EMPOWER without legislative action. Reform should include:

- Requiring that the core objective of EmPOWER shift from focusing solely on reduced electricity consumption to emphasizing reduced/avoided greenhouse gas emissions
- Modifying Empower to focus on electrification and prohibit use of Empower support for new fossil fuel. (refer to HB708, pg 24, lines 5-20)

We look forward to working with the bill sponsor and leaders throughout the legislature on these proposed amendments.

With 3,000 miles of tidal shoreline, Maryland is one of the most climate-vulnerable states in America – just from sea-level rise. We are also experiencing more extreme weather events including two "1000-year floods" to Ellicott City in just 22 months. We must act boldly and urgently to address climate change. We must update our climate commitments and enact a plan to reach them.

Thank you for your consideration of SB0528, Climate Solutions Now. For all the reasons stated above, we urge a favorable vote from the committee with the inclusion of these amendments.

Endorsing Organizations

350 Baltimore
350 Montgomery County
Adat Shalom Climate Action
AIA Maryland
Annapolis Green
Assateague Coastal Trust
Audubon Naturalist Society
Blue Water Baltimore
Casa de Maryland
Cedar Lane Unitarian Universalist Church
Center for Progressive Reform
CHEER
Chesapeake Bay Foundation
Chesapeake Climate Action Network
Chesapeake Physicians for Social Responsibility
Chispa MD
Clean Air Prince Georges
Climate Law & Policy Project
Climate Law & Policy Project
Climate Mobilization Montgomery County
Climate Parents of Prince Georges
Climate Reality Baltimore Area Chapter
Climate Stewards of Greater Annapolis
Climate XChange - Maryland Coalition For Smarter Growth
Columbia Association
Climate change and sustainability advisory committee
Concerned Citizens Against Industrial Cafos
DoTheMostGood Montgomery County
Echotopia
Elders Climate Action Maryland
Environmental Justice Ministry
Frack Free Frostburg
FSi Engineers
Glen Echo Heights Mobilization
Greenbelt Climate Action Network
HoCo Climate Action
Howard County Sierra Club individual
Indivisible Howard County
Interfaith Power & Light (DC.MD.NoVA)
Labor for Sustainability
Laurel Resist
League of Women Voters of Maryland
Maryland Campaign for Environmental Human Rights
Maryland Environmental Health Network
Maryland League of Conservation Voters
Maryland Legislative Coalition
Maryland NAACP State Conference, Environmental Justice Committee
Maryland Poor People's Campaign
MaryPIRG Student Climate Action Coalition
MCPS Clean Energy Campaign
MD Campaign for Environmental Human Rights
Mid-Atlantic Earth Holders
Mid-Atlantic National Parks and Conservation Association
Ministry of Maryland
MoCo DCC
Montgomery Countryside Alliance
Montgomery County Faith Alliance for Climate Solutions
Mountain Maryland Movement
NAACP Maryland State Conference, Environmental and Climate Justice
Nuclear Information & Resource Service
Potomac Conservancy
Safe Skies Maryland
Strong Future Maryland
Takoma Park Mobilization Environment Committee
Talbot Rising
The Nature Conservancy
Unitarian Universalist Legislative Ministry of Maryland
Waterkeepers Chesapeake
Wicomico NAACP
WISE

Priority Amendments

Building electrification and efficiency:

- Climate Catalytic Capital Fund
    - Explicitly state that 40% of funds from the Climate Catalytic Capital Fund be spent in low and moderate-income neighborhoods and that funds can be spent on whole-structure retrofits (including multi-family buildings) including health, safety, weatherization, and electrification measures.
    - The purpose of the funds should explicitly include "Facilitate the electrification of the building sector".
    - Explicitly state that funds cannot be used for installation of new equipment that uses fossil fuels
    - Funds from alternative compliance payments should go to the Climate Catalytic fund to be spent on low-income whole-structure retrofits, including low-income multi-family buildings.
- On page 35, lines 2-3, strike "water and space heating" and substitute "on-site energy" and add on line 3, "except for kitchen appliances".
- Insert on Page 35, following line 6
  (12-501(3)(I)(2)(A (under the provision requiring solar ready):
  A. The Installation of Solar Energy Systems
    - To include a 40% roof set aside and necessary electrical panel and conduit requirements. if the building:
    - Will have 20,000 square feet or more of continuous roof space, excluding the parking area; and
    - Will be 20 stories or less in height, above grade plane.

  B. Regulations adopted under this subsection may authorize a local jurisdiction to waive the solar–ready requirement for a building on a specific finding that:
    - incident solar radiation at the building site is less than 75% of incident solar radiation at an open site; or
    - shadow studies indicate that 25% of a building's roof area will be in shadow.
- On page 35, following line 9, add energy efficiency provisions for buildings. Add:
  D. For new covered buildings funded at least 25% by State funds
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2023 and Dec 31 2025
    - A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

  E. For all other new covered buildings
    - A 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received between Jan 1 2025 and Dec 31 2027

- A 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code for permit applications received F. MAJOR RENOVATIONS – Energy Conservation

F. "Major Renovation" means a renovation project:

- For which the total projected cost exceeds 50% of the assessed value of the existing building; or
- Involving a change of use, if the change involves the application of different requirements of the standards.

G. Except as provided in subsection (_) of this section, if a covered building is undergoing a major renovation, the building shall be renovated to achieve:

- A 40% reduction in the building's average annual energy use; or
- A 20% reduction in modeled energy use consumption over the current Energy Code.

H. A local jurisdiction may waive the requirements under subsection (_) of this section if the building owner demonstrates that the cost of the improvements necessary to achieve the required energy reductions would exceed projected operational and energy savings from the improvements over a certain payback period:

- A 25–year period for all buildings funded at least 25% by the State.
- A 15–year period for all other buildings.

- Provisions regarding "alternative compliance pathway" on page 47, lines 20 -23, and lines 27-29, should be sunsetted. We suggest a sunset of 12/1/2030
- Pages 47, delete lines 18-19 ("PROVIDE MAXIMUM FLEXIBILITY TO THE OWNERS OF COVERED BUILDINGS TO COMPLY WITH BUILDING EMISSIONS STANDARDS")
- The Building Emission Performance Standards regulations directive under 2-1602 (C) should
    - require that the adopted regulations prioritize direct emission reductions from qualified buildings via electrification plans and pathways,
    - provide protection against financial cost pass-through and evictions for tenants in covered multi-family buildings, 3) require covered public buildings' retrofits to be completed with a high-quality workforce (i.e. prevailing wage, insurance coverage, paid leave, etc.) (pg. 48)

Equity and Environmental Justice Provisions

- Strengthen the provisions on pages 9-12 by including language that requires 40% of investments go to overburdened communities and Rosenberg Justice 40 bill and/or the Boyce/Watson all agency climate, equity, and labor test language.
    - The language in the Boyce/Watson all agency climate, equity and labor test should be incorporated on page 22, lines 12-15 as well
    - The Interagency Commission on School Construction should be included as an agency required to consider climate in long-term planning

Net Zero Schools

- Explicitly state that the IAC state school construction funding process may cover planning, design, and engineering for net-zero schools.

- School buildings that are not net-zero energy should be net-zero energy ready.
- Delete "subject to the availability of funding" on Page 8 Line 14 and replace that language with one of the options below -
- P. 8, line 9-13, (5-312(c)(2)(I), Delete para. "Except as Provided in . .
  Delete 5-312 (c) (2) (I) of the Education Article that was inserted: except as provided in subparagraph (iii) of this paragraph, the net-zero energy requirements that apply for a building to meet the definition of a 'high performance building" under § 3-602.1 12 of the state finance and procurement article

  OR

  Amend to read: Except as provided in Subparagraph III of this Paragraph, Public Schools shall be required to achieve a 40% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2023 and a 60% reduction in modeled energy use consumption over the 2018 International Energy Conservation Code by 2025.
- Pg 40 line 15-17. Remove having the Council develop guidelines and instead require them to provide an annual report on the status of meeting the high performance building requirements.
- Pg 8, line 25 – pg 9, line 2. If a school qualifies for a waiver because the Interagency Commission determines that either (I) or (II) is true, the school must be net-zero READY.

Buy Clean Maryland Act

- Consider adding To SB528 the **Buy Clean Maryland Act** provisions from HB806 - Del. Stein Public Buildings bill with one change related to the waiver provisions.
  - Section 4-904 (E) **Strike** - ~~(4) RESULT IN ONLY ONE SOURCE OR MANUFACTURER BEING ABLE TO PROVIDE THE NECESSARY MATERIALS.~~
  - **Add** - (F) IF ONLY ONE SOURCE OR MANUFACTURER IS ABLE TO PROVIDE THE NECESSARY MATERIALS, A SOLE SOURCE PROCUREMENT MAY BE ALLOWED, PROVIDED NONE OF THE OTHER WAIVER DETERMINATIONS ARE MADE.

Oppostion Testimony - SB528 - Climate Solutions No
Uploaded by: Aaron Tomarchio
Position: UNF

LEGISLATIVE TESTIMONY

To: Chairman Pinsky and members of the Senate Education, Health & Environmental Affairs Committee
Chairman Guzzone and members of the Senate Budget & Taxation Committee

From: Aaron Tomarchio, EVP, Corporate Affairs

Re: **OPPOSE – SB528 – Climate Solutions Now Act of 2022**

Tradepoint Atlantic (TPA), the owner, manager, and developer of Sparrows Point, the former home of Bethlehem Steel in Southeast Baltimore County has significant concerns with SB528.

TPA has taken on the challenge to clean up and remediate the environmental impacts of a century of steel making and prepare the site for re-development. It is our hope to remake Sparrows Point into a global center of excellence as a leading tri-modal transportation, distribution, manufacturing and logistics hub. The potential of this location represents a unique opportunity, and a proposition to the State of Maryland. Passage of this bill could undermine Sparrows Point's and the state's ability to compete to attract new and or encourage expansion of business within the state.

- Decouples Maryland from the International Building Code Standard and hurts Maryland's competitiveness.
- Grid Reliability – Single sourcing Maryland's energy exposes the state and its businesses to higher risks of grid failure and to energy security vulnerabilities that could make Maryland an easy target for potential bad actors seeking to threaten national and or state energy supply.
- Harms manufacturing site selection and expansion - There should be language explicitly exempting manufacturing facilities and operations. While there is a manufacturing carve out in state's Green House Gas Reduction Act, this bill should re-commit to that exemption to prevent confusion in the marketplace.
- No clear mitigating offsets identified to help existing budlings come into compliance. Creates potential for market confusion while state agencies debate and develop policy.
- The bill's timeline creates an artificial energy cliff for Maryland's businesses, pushing Maryland far ahead of carbon reduction timelines adopted by the international community.
- Bill should recognize the use of blended fuel approaches as a mitigating measure to help ween existing buildings off fossil fuels.
- Places a large burden on utility providers to bring new capacity online within a very limited time frame. Considerations should be given to fast-track state utility permitting and regulatory processes that create burdensome and unpredictable long lead times to develop new projects to expand capacity.
- No representation of development and other businesses entities, or utility providers on any of the established workgroups.

This bill negatively impacts Maryland's business competitiveness, sends mixed messages to potential manufacturers and site selectors, creates a period of uncertainty in the marketplace, exposes Maryland to energy security risks, and places extensive unattainable burdens on utility providers to single source and grow energy capacity within short period of time. We respectfully urge the committee to render an **unfavorable** report.

About Tradepoint Atlantic

The 3,200-acre industrial site and former home of Bethlehem Steel in Baltimore, Maryland, offers a gateway to markets around the United States and the world, featuring a unique and unmatched combination of access to deep-water berths, rail, and highways. Groundbreaking agreements signed with federal and state environmental regulators in 2014 to remediate the legacy from a century of steelmaking enable the redevelopment of the site with the potential to become one of North America's most strategic multi-modal, multi-commodity global logistics hub.

Contact: Aaron Tomarchio, EVP, Corporate Affairs
atomarchio@tradepointatlantic.com | 443-299-9803

2022 GBCC Climate Solutions Senate[4].pdf
Uploaded by: Ashlie Bagwell
Position: UNF

THE GREATER BETHESDA
CHAMBER of COMMERCE

Testimony on behalf of the Greater Bethesda Chamber of Commerce

In Opposition to
Senate Bill 528---Climate Solutions Now Act of 2022

February 15, 2022
Senate Education, Health and Environmental Affairs Committee

The Greater Bethesda Chamber of Commerce (GBCC) was founded in 1926. Since then, the organization has grown to more than 550 businesses located throughout the Greater Bethesda area and beyond. On behalf of these members, we appreciate the opportunity to provide written comments on Senate Bill 528—Climate Solutions Now Act of 2022.

The Greater Bethesda Chamber of Commerce supports reasonable policies that reduce greenhouse gas emissions and enhance sustainability. We worry, however, that what is required in Senate Bill 528 is *un*reasonable based on the timelines for meeting the bill's goals coupled with the costs associated with doing so. The bill calls for developing a detailed plan of action focused on how the state will achieve a dramatic reduction in greenhouse gas emissions. We think a plan makes sense, especially on a matter this complex. However, we do not believe the state should, at the same as mandating a study, make such drastic policy changes as the ones contemplated in Senate Bill 528, without the benefit of fully thinking through the implications of such changes. While we are certainly not energy policy experts, we are concerned about the impact of this bill on things like access to affordable housing, our ability to compete with neighboring jurisdictions and our state's energy infrastructure .

Senate Bill 528 may also compromise Maryland's economic competitive. This legislation goes well beyond:

- United Nations recommendations that countries reach net-zero by 2050;
- Biden Administration recommendations that states reduce greenhouse gas emissions by 50% by 2030;
- The Maryland Commission on Climate Change's recommendations that Maryland reduce greenhouse gas emissions by 50% by 2030; and
- Every city and county that has considered similar decarbonization policies.

With this proposal exceeding the targets of jurisdictions at every level of government, it is reasonable to question the impacts of this legislation on Maryland's economy.

For these reasons, we would respectfully request an unfavorable vote on Senate Bill 528. Thank you for the opportunity to provide written comments.

SB 528 API oppose.pdf
Uploaded by: Bernie Marczyk
Position: UNF

American Petroleum Institute
Northeast Region

Michael S. Giaimo
Northeast Region Director
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February 14, 2022

Senate Education, Health, and Environmental Affairs Committee
2 West
Miller Senate Office Building
Annapolis, Maryland, 21401

IN RE: Comments to SB 528, An Act Concerning Climate Solutions Act Now 2022

Dear Senator Paul G. Pinsky, Chair; Senator Cheryl C. Kagan, Vice Chair; and Committee Members:

Thank you for this opportunity to provide comments relative to SB 528. While this is a comprehensive bill, the comments that follow focus on the legislation's "requirement that all new buildings meet all water and space heating demand without the use of fossil fuels," and the "building emissions standards." The American Petroleum Institute (API)[1] opposes the inclusion of this language in SB 528 and strongly encourages the committee to refrain from passing a ban on the use of natural gas in new building construction and encourages the legislature to preserve consumer choice with respect to space- and water-heating options.

Need to Preserve Consumer Choice

Policymakers should strive to give consumers options. Competition is imperative to protect consumers while driving innovation, ingenuity and progress. Legislators should not pick winners and losers but should allow resources and technologies to compete. Free market policies provide the consumer with options to select products that best fit their unique circumstances. This legislation would remove natural gas from the space- and water-heating markets, stripping the consumer of the right to select a heating fuel that is comfortable, economical and reliable. A ban on heating fuels represents the worst type of ban because it effectively affords consumers only one option – electric heating. Additionally problematic is the fact that a ban when there is only one substitute leaves consumers with no options and no hedge if the cost of the substitute rises due to increased demand. API believes Maryland's current energy policy that allows consumers to choose both natural gas and electric options is reasonable and is good public policy.

Potential for Significant Cost and Reliability Concerns

As you analyze this legislation, API encourages you to consider potential cost impacts this bill may have on consumers, especially those in overburdened communities. This legislation will likely increase building and operating costs for commercial, industrial, and residential buildings, including affordable housing. According to research conducted for the National Association of Home Builders, all-electric homes cost more upfront in

[1] The American Petroleum Institute represents all segments of America's natural gas and oil industry, which supports more than 11 million U.S. jobs. Our nearly 600 members produce, process, and distribute the majority of the nation's energy. API members participate in API Energy Excellence,[1] through which they commit to a systematic approach to safeguard our employees, environment and the communities in which they operate. Formed in 1919 as a standards-setting organization, API has developed more than 700 standards to enhance operational and environmental safety, efficiency, and sustainability.

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comparison to gas homes.[2] Specifically, the overall range of estimated electrification costs for an electric reference house compared to a baseline gas reference house in cold weather climates was between $11,000 and $15,000.[3] The higher costs in colder, heating-dominated climates are due to the need for more expenisive heat pumps rated to operate in colder temperatures. The more expensive electric equipment can also result in higher energy use costs by $84 to $404 annually compared to a baseline gas house, and by $238 to $650 annually compared to a gas house with high efficiency equipment. Consumers in colder climates will therefore likely be faced with higher upfront construction costs and higher operating costs throughout the life of the equipment.[4]

The legislation will also require electric heating systems for certain existing public and privately owned commercial and multifamily residential buildings (25,000 plus square feet) by 2030 and 2035. Requiring all new buildings to be all electric is straightforward enough; however, requiring that existing buildings be retrofitred is another matter entirely. The costs can be very high—perhaps in the tens of thousands of dollars per unit. In many homes the electric system does not have sufficient capacity and would need to be completely redone.[5]

An all-electric heat mandate is bad public policy. Maryland is looking toward a future with greater electrification in the transportation and building sectors. These policies will likely increase the demand for electricity significantly, which in turn may force the state to rely on the the use of old and less efficient power plants in other states. This committee must realize and appreciate that policies that increase electrification may also necessitate investments in large-scale electric transmission infrastructure which is expensive and frequently controversial. Electrification can also result in increased imports and utilization of power derived from carbon-emitting resources.

A move to all-electric heating will also leave Marylanders at the mercy of a power grid that is increasingly reliant on intermittent renewables. We have seen the potential consequences of this in Texas and California – both of which rely heavily on wind and solar. When these resources underperform, grid stability and reliability can be compromised and residents can be left in the dark and cold.

A study from GTI Energy found that power system outages are more than 100 times more frequent than gas system outages. It further notes that extreme weather is more likely to impact power systems than gas

[2] *See* https://www.nahb.org/-/media/NAHB/nahb-community/docs/committees/construction-codes-and-standards-committee/home-innovation-electrification-report-2021.pdf.

[3] The study included the cold weather climates of Denver and Minneapolis.

[4] *Ibid*. Climate zone had a strong influence on both construction costs and energy use costs. In colder climates, heat pumps with variable refrigerant flow rated for operation during low outdoor temperatures are needed. Often referred to as cold climate heat pumps, these systems are more expensive: $8,000-$9,000 more compared to a gas furnace.

[5] Two reports out of California, one from San Francisco and the other from Palo Alto, provide additional examples of the potential cost implications of all-electrification. In April 2021, San Francisco's Budget and Legislative Analyst's Office issued a memo that notes that the estimated costs of electrical appliance retrofitting of homes range from $14,363 per housing unit (both multi-family and single-family units) to $19,574 for multi-family units, and $34,790 for single-family homes at the higher end, and that the city-wide cost to retrofit all residential units currently using natural gas-fueled appliances with those fueled by electricity ranges from $3.5 to $5.9 billion. Budget and Legislative Analyst's Office, *Memo to Supervisor Mar* (Apr. 22. 2021), *available at* https://sfbos.org/sites/default/files/BLA.ResidentialDecarbonization.042221.pdf. In November 2016, a report submitted to the City of Palo Alto estimated that to accommodate electric space heating in California, it would cost $4,700 to upgrade the electricity service for an existing single-family building and $35,000 for a low-rise multifamily building. Peter Pernijad, *Palo Alto Electrification Study*, TRC Energy Services (Nov. 16, 2016) *available at* https://www.cityofpaloalto.org/files/assets/public/development-services/advisory-groups/electrification-task-force/palo-alto-electrification-study-11162016.pdf.

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systems.[6] This means that an all-electric home and building requirement could leave residents more exposed to heating system failure. The use of natural gas for heating provides a hedge against the potential reliability challenges associated with an aging and overburdened grid that relies heavily on intermittent generation, and therefore the state should not ban it. The use of gas for heating provides a hedge against potential reliability challenges.

Unintended Consequences

Legislators should appreciate that moving the state to electric heat and heat pumps can have the profound and unintended consequence of incentivizing customers to purchase and use backup generators that run on fossil fuels. These generators can be loud, dangerous, and costly if operated improperly. For example, one county in Texas reported that it had 300 suspected cases of carbon monoxide poisoning during Winter Storm Uri last February, many of which were related to residents running backup generators indoors to stay warm when their electric heating systems were not functioning.[7]

Maryland lawmakers must first understand and appreciate the economic and environmental cosequences of additional backup generators before embarking on a future of only electric heat in new construction. Additionally, the state should fully appreciate that a policy that requires the installation of heat pumps can result in building construction delays and increased costs as global demand for heat pumps increase (particularly as other states and countries consider implementing an all-electric building policy).

Conclusion

For all of the reasons outlined above, API respectfully *opposes the bill* as introduced because it removes consumer choice with respect to heating fuels, can be costly, and can produce unintended results.

Respectfully submitted,

Michael S. Giaimo
Northeast Region Director
American Petroleum Institute

[6] *See* https://www.gti.energy/wp-content/uploads/2018/11/Assessment-of-Natural-Gas-Electric-Distribution-Service-Reliability-TopicalReport-Jul2018.pdf.

[7] *See* https://www.bbc.com/news/world-us-canada-56095479.

SB0528 -- Climate Solutions Now Act of 2022.pdf
Uploaded by: Brian Levine
Position: UNF

Senate Bill 528 -- *Climate Solutions Now Act of 2022*
Senate Education, Health, and Environmental Affairs Committee and
Senate Budget and Taxation Committee
February 15, 2022
Oppose

The Montgomery County Chamber of Commerce (MCCC), the voice of business in Metro Maryland, opposes Senate Bill 528 -- *Climate Solutions Now Act of 2022.*

MCCC appreciates the broad vision offered in Senate Bill 528, but contends an incremental path, like first mandating the electrification of the state vehicle fleet and local school buses, is a more prudent approach. MCCC is concerned that implementing all of Senate Bill 528's climate policies and reaching net zero emissions over such a short timeline is unrealistic and costly to business owners still struggling from the effects of the COVID-19 pandemic. Priorities should first be set to electrify, or use "cleaner" energy for those items controlled at the state and county level rather than targeting the private sector. In addition, an incremental roll out will provide additional time for necessary infrastructure improvements as discussed below.

The requirement that buildings meet net zero requirements would represent a substantial cost that would be passed along to businesses and consumers. The provisions of Senate Bill 528 are not only expensive, but the bill as written provides little or no guidance on how to meet emissions reduction targets. Paired with other legislation that would authorize charter counties to provide for the enforcement of local building energy performance laws by imposing civil fines of up to $10 per square foot, Senate Bill 528 could have significant financial implications which are punitive and cost prohibitive for commercial buildings and real estate.

Senate Bill 528's language that requires privately-owned buildings to reduce emissions by a seemingly arbitrary percentage and cut emissions to net zero does not adequately consider high performing buildings, or buildings currently in construction or planned for construction that may already be meeting, or planning to meet, rigorous environmental standards. Requiring newer "green buildings", outfitted with costly upgrades, to retrofit and further reduce their environmental footprint will be expensive or even impossible to achieve. Senate Bill 528 needs to provide grandfathering of existing "green buildings" that were built or have been designed to meet or exceed current rigorous environmental standards. We should not look at net zero as a light switch, but rather as a continuum.

Senate Bill 528 also creates a tremendous amount of uncertainty about whether there is sufficient electric generation capacity within the timeline of this bill's requirements. This is one outcome of banning natural gas, which creates many more problems than it would purportedly solve and would add billions of dollars of additional costs to businesses and consumers. Delivering significantly more electricity into Maryland will require expensive upgrades and improvements to the electric grid that are, at this time, unrealistic to achieve for

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a variety of reasons. Delivering the power required in Maryland will force risky and expensive upgrades to the electric grid and these costs will be passed through to all Maryland ratepayers at a time when the economy is still suffering from the effects of the COVID-19 pandemic.

MCCC is also concerned about the very limited ability of building owners to seek a waiver of the strict emission standards contained in Senate Bill 528. The availability of natural gas service is a critical factor considered by businesses when seeking to locate in a particular area. Maryland should consider other options that are more practical and less expensive for lowering greenhouse gas emissions.

For these reasons, the Montgomery County Chamber of Commerce opposes Senate Bill 528 and respectfully requests an unfavorable report.

The Montgomery County Chamber of Commerce, on behalf of our nearly 500 members, advocates for growth in business opportunities, strategic investment in infrastructure, and balanced tax reform to advance Metro Maryland as a regional, national, and global location for business success. Established in 1959, MCCC is an independent non-profit membership organization and a proud Montgomery County Green Certified Business.

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SB 528_BOMA_UNF.pdf
Uploaded by: Bryson Popham
Position: UNF

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February 15, 2022

The Honorable Paul G. Pinsky, Chairman
Senate Education, Health, and Environmental Affairs Committee
2 West Miller Senate Office Building, 11 Bladen Street
Annapolis, MD 21401

RE: Senate Bill 528 - Climate Solutions Now Act of 2021 - UNFAVORABLE

Dear Chairman Pinsky and Members of the Senate Education, Health, and Environmental Affairs Committee:

I am writing on behalf of the Building Owners and Managers Association (BOMA), in opposition to Senate Bill 528.

BOMA is a trade association that represents the interests of commercial and real estate owners, real estate professionals and our associate members through effective leadership in advocacy, collection and dissemination of industry information, education, community involvement, membership participation, and professional development.

Furthermore, BOMA acknowledges the leading role that Maryland has taken among states in addressing the broad issue of climate change, with a series of legislative enactments intended to promote sustainability and to improve the environment in which all Marylanders must live. These actions include the creation of the Maryland Commission on Climate Change (Commission), which has become a guiding force for State policy on this subject. BOMA has itself been an industry leader in this effort, both in the state and through its national organization, the Building Owners and Managers Association International (BOMI).

The Commission issued its most recent annual report on November 15, 2020. The report noted "the escalating urgency of climate change," and it is fair to say that one central recommendation from the report is embodied in SB 528: that the State achieve net-zero greenhouse gas emissions by 2045. Another central recommendation of the report, that the state achieve a statewide emissions reduction goal of 50% (from 2006 levels) by 2030 has been changed in the bill to a 60% reduction. By the report's own characterization, these and other ambitious recommendations are being treated by the Maryland Department of the Environment (MDE) as "stretch targets." The report also notes that MDE must submit, in 2022, a "progress report on the state GHG reduction efforts *and the economic impact of the GGRA of 2016 Plan".* Finally, the report cites the General Assembly's power to "maintain, revise, or eliminate" the 2030 goal and consider whether to continue economic impact provisions. In other words, the General Assembly will certainly be active in addressing this important subject continuously over the next several years.

No reasonable person disputes the serious problem of climate change, and that our government has an obligation to analyze it and act accordingly. The Commission was established for that purpose, and it is fulfilling its role. The General Assembly must also take into account, however, the impact that enacting Commission recommendations into law will have on our citizens. It is a constant balancing act for which the stakes are high on both sides.

With respect to the commercial buildings that form the core of BOMA members' assets, they comprise the workplaces of most of our State economy throughout Central Maryland. Our experience with economic upheaval caused by the pandemic over the last year illustrates how government action can significantly disrupt the lives of our citizens in important ways. Our State and local governments continue to struggle to achieve a balance between rational public health practices and the orderly conduct of business and personal life in Maryland.

The same balancing act will be needed in dealing with climate change. One laudable idea for this problem is another Commission recommendation, found on page 31 of the report, to revive an interagency task force whose objective is to coordinate across programs, policies and funding streams, an effort to retrofit Maryland's existing residential and commercial buildings to achieve healthier, safer, more efficient, and climate-friendly homes and businesses (Commission report, pp31-32). At a time when many buildings owned and operated by BOMA members have been vacant for a year, or nearly so, when the ability of tenants to pay rent is in question, and, most important, when the future use of these buildings is being considered by the owners, imposing the ambitious goals at the heart of SB 528 is premature. As a society, we must spend the balance of 2021 working through this incredibly difficult time, and BOMA members must decide how their buildings will be used in the future. Those uses will have a direct and material impact, in turn, on energy usage, emissions, and the production of greenhouse gases.

For these reasons, BOMA respectfully requests an unfavorable report on Senate Bill 528.

Very truly yours,

Bryson F. Popham

cc: Kevin Bauer
Joan Smith

BGE - SB 528 Carbon Solutions Act --Oppose.pdf
Uploaded by: Charles Washington
Position: UNF

bge
AN EXELON COMPANY

Position Statement

OPPOSE
Senate Education, Health, and Environmental Affairs
2/15/2021

Senate Bill 528: Climate Solutions Act of 2022

Baltimore Gas and Electric Company (BGE) respectfully opposes *Senate Bill* 528: *Climate Solutions Act of 2022.* Senate Bill 528 seeks to dramatically alter Maryland's established greenhouse gas emission (GHG) goals, based loosely on a 2021 report from the Maryland Commission on Climate Change (Commission). While the Commission recommended a 50% reduction in GHG by 2030, the bill sets the more aggressive targets of 60% by 2030 and net zero by 2045.

The legislation requires the Maryland Department of Environment to propose a plan to achieve the revised GHG reduction goals by June 30, 2023. In advance of this effort, which would assumably consider the various pathways to achieve the stated goals, SB 528 seeks to eliminate a valuable tool for advancing decarbonization policies by placing restrictions on the use of the State's existing natural gas infrastructure. Here again, SB 528 departs from the Commission recommendations by requiring state building codes to prohibit space and water heating with natural gas and other fuels by 2023, significantly earlier than the Commission's 2027 recommendation.

While BGE is supportive of electrification and decarbonization, the company opposes SB 528. This legislation proposes the nation's most aggressive electrification and decarbonization targets without leveraging the collective wisdom of diverse stakeholders to evaluate all options to achieve the desired reductions, to understand the likely consequences of those options, and to ensure the continued delivery of safe, reliable, and affordable service.

<u>BGE's Commitment to Decarbonization</u>
Over the past several years, BGE has demonstrated its commitment to electrification and decarbonization. In addition to supporting well-conceived policies in regulatory and legislative forums, the company announced our *Path to Clean:* a commitment to cut our own operational emissions by at least 50% by 2030 and achieve net-zero operations-driven emissions by 2050. To achieve these goals, BGE will implement a series of initiatives designed to modernize our delivery systems; reduce energy use in our offices and buildings; increase our use of renewable-powered energy; and electrify our company's vehicle fleet. In addition, BGE's Empower Maryland programs have been highly successful in lowering energy usage and GHG emissions for residential and commercial customers, generating over 5 million MWh of energy savings valued at approximately $6 billion in lifecycle customer bill savings.

Sandy Grace | Charles Washington | Allyson Black | 410.269.5281

Unprecedented and Aggressive Targets

Despite BGE's general support for electrification and decarbonization, BGE is concerned about the aggressive approach codified within SB 528. No state in the country has adopted a statewide building code that prohibits the use of natural gas for space and water heating. While states like California, New York, and Massachusetts are considering decarbonization policies, all are more measured in the timelines for implementing building decarbonization efforts. Even legislation proposed by smaller jurisdictions better accounts for the challenges, feasibility, necessary exceptions, and economic impacts inherent is such a transformative policy shift.

SB 528's misalignment with other decarbonization proposals, would put Maryland at a competitive disadvantage with other states. Further, this legislation proposes targets and timelines that exceed the recommendations of the Commission. Simply put, the economic impact of such a policy sea change, without the benefit of a study to examine its effects, would expose Maryland to a number of preventable unintended consequences, were SB 528 were enacted as drafted.

Necessary Electric Infrastructure Investments

The BGE territory serves 54% of Maryland's residential gas customers and 55% of commercial and industrial gas customers. Collectively, these customers represent nearly half of statewide natural gas use in Maryland's buildings and industry. Of this natural gas use, approximately 25% is for harder to electrify large commercial and industrial users.

BGE is supportive of efforts to decarbonize the building stock in our service territory. However, such a meaningful policy shift requires time for planning, implementation, and considering emerging technologies. If SB 528 were enacted, it would drive a requirement for significant investments in our electric infrastructure to serve the resulting load. While the exact scope of the required investments cannot be fully predicted without detailed knowledge of where growth will occur on the system, we anticipate the need for major infrastructure components, including substations and new feeder lines.

Installing this infrastructure would require time to: analyze the detailed capacity needs on the system; find and acquire land for new infrastructure in areas acceptable to our customers; plan and design capital projects; obtain the required permits and approvals; and construct the required substations and feeders. This process is further complicated by escalating supply chain challenges that are increasing the lead time for critical infrastructure equipment. For example, lead times for distribution transformers have increased fivefold from their typical timeframes.

BGE is concerned that the implementation timelines within SB 528 do not provide adequate time to prepare for load growth on the electric system. In addition, SB 528 does not provide tools to streamline the processes and costs for making required investments. Without the required time and tools, it is possible that the grid will be unable to serve new load during times of peak energy usage.

Customer Costs

SB 528 will drive costs higher for BGE's existing customers. According to modeling of the BGE territory, residential gas customers can expect to pay $10,000 or more per household for heating costs and retrofits. In aggregate, this shift will cost our residential and commercial gas customers no less than $2.8 billion. These projections do not include the electric infrastructure costs described above to ready the system for load growth. Even the Commission's report acknowledges these costs will be significant. The combined impact will be billions of dollars for BGE's customers alone, and even higher statewide. With such a meaningful price tag, this approach does not represent the least cost path or even an efficient cost path to decarbonization.

Flawed Approach Eliminates Potential Pathways

There are various pathways for Maryland to achieve deep decarbonization, and the Department of Environment should consider all options as it develops the plan to achieve the GHG reduction targets.

As a combination gas and electric utility, BGE can offer a diversity of energy solutions to our customers for a reliable, resilient, affordable, and net-zero future. We are exploring how our gas and electric systems can work together to support decarbonization. Both pipeline and wire infrastructure assets can have strong roles to play in designing a decarbonized future that meets all energy needs at all times.

Unfortunately, SB 528 effectively disqualifies this integrated approach and ignores solutions like Renewable Natural Gas, hydrogen blending, and carbon capture, among others. Instead, this bill will drive the need for significant new electric capacity at a high cost.

SB 528 drives Maryland towards unprecedented and unsupported decarbonization targets and building transitions. In so doing, the legislation does little to consider other plausible decarbonization pathways and fails to prepare the electric system for the resulting load. For these reasons, BGE opposes SB 528 and respectfully requests an unfavorable committee report.

SB528-Climate Solutions- Letter of Opposition.pdf
Uploaded by: Craig Mathies, Sr.
Position: UNF

COMMISSIONERS FOR SOMERSET COUNTY
11916 SOMERSET AVENUE, ROOM 111
PRINCESS ANNE, MARYLAND 21853
TELEPHONE 410-651-0320, FAX 410-651-0366

February 15, 2022

The Honorable Paul G. Pinsky
Education, Health, and Environmental Affairs Committee
2 West
Miller Senate Office Building
Annapolis, MD 21401

Re: SB528-Climate Solutions NOW Act of 2022- Letter of Opposition

Dear Chairman Pinsky and Committee Members:

On behalf of the Commissioners for Somerset County, this is written to express our respectful, but strong, opposition to certain provisions within SB 528. First and foremost, Somerset County has a long history of taking actions to reduce the effects of climate change. And although there are many provisions within SB 528 (*e.g.*, electrifying the state vehicle fleet) we favor, we oppose the provisions in the bill that would: (1) ban natural gas in all new buildings on or before January 1, 2023; and (2) impose strict emission limitations on certain existing commercial and multi-family residential buildings that ratchet down over the next several years and impose severe fees on the owners of those buildings if they cannot convert off of gas service.

As you may know, a natural gas company recently completed the construction of a line that will bring natural gas service to the University of Maryland – Eastern Shore, the Eastern Correctional Institution and the US 13 corridor. This gas line has been a priority of Somerset County for decades and we greatly appreciate the help the State provided in making this happen. For years, potential employers have been hesitant to locate in Somerset County due to its lack of natural gas service. Now that the line is finished, employers and property owners (including certain agri-businesses, the Princess Anne Industrial Park and home builders) are counting on the ability to connect to natural gas.

This natural gas line will lower overall CO2 emissions in the County (by replacing dirtier fuels like propane and fuel oil) and will serve as a driver for economic development. Accordingly, the Somerset County Commissioners are extremely concerned about the negative impact certain provisions of SB 528 would have in our County. According to the Maryland Commission on Climate Change ("MCCC"), building direct use emissions account for 13% of economy-wide GHG emissions in Maryland. In an attempt to achieve this purported 13% reduction, the MCCC estimated that implementing a natural gas ban on new and existing buildings would result in significant compliance costs for building owners and require billions of dollars of upgrades to the electric grid that serves Maryland. All of these costs will be borne by Maryland residents.

Among other things, SB 528 requires the Maryland Department of Labor to adopt regulations that ban the use of natural gas in **all new buildings (NO exceptions) on or before January 1, 2023.** In addition, the bill requires the Maryland Department of the Environment to adopt strict building emissions standards applicable to "covered buildings" (*i.e.*, all commercial and multi-family residential buildings with a gross floor area of 25,000 square feet or more) phased in over several years until the buildings achieve a net-zero energy balance. We are aware of only two other states (Colorado and Washington) that have enacted similar legislation – but those laws apply only to buildings 50,000 square feet or larger.

SB 528 authorizes local governments to grant a variance from the natural gas ban for a new building - but only if the new building can pass a "cost-effectiveness" test and demonstrate that cost to comply with the gas ban is greater than the "social cost of the greenhouse gases that would be reduced by complying with the requirements." The bill dictates the requirements of this "cost-effectiveness" to include certain "projections" that skew the results in a way that make it difficult (if not impossible) for any building to pass. For example, SB 528 requires the "cost-effectiveness" test to "account for *projected* utility cost rates and emissions rates" as adopted by MDE or the U.S. EPA, whichever is greater. We understand that the reliability of many of the assumptions that support the calculation of "projected" increases in utility rates and emission rates are subject to significant debate by experts. In practice, we believe this "cost-effectiveness" test is illusory and we have real concerns about this variance process.

Finally, the Maryland Commission on Climate Change ("MCCC") recently approved a Building Energy Transition Plan. This Plan's recommendations are quite similar to the natural gas ban and existing building emissions standards proposed by SB 528.The MCCC's Building Energy Transition Plan estimates that the costs for its recommendations are in the multiple billion-dollar range annually (ranging from $1.5 to $4 billion annually just in electric transmission and capacity upgrades, $3 billion in alternative compliance payments; higher electric and gas rates, *etc.*). Moreover, we understand the basis for these cost estimates are questionable and therefore these costs could be much *higher*.

In summary, we are extremely concerned about the above-mentioned provisions within SB 528. Respectfully, we believe that artificially choking off the ability of customers to choose natural gas will defeat all of the hard work the Somerset County has expended over the last several years to bring the natural gas line to the County. We ask that you please consider our serious concerns as you review and debate the Climate Solutions Now Act of 2022. Most certainly, please do not adopt <u>any</u> natural gas ban or existing building emission standards until they are subject to much more scrutiny and study.

Sincerely,

Craig N. Mathies, Sr.
President

Cc: Senator Carozza
Delegate Otto

02.15.22 - SB0528-- Climate Solutions Now Act of 2

Uploaded by: Donald Fry

Position: UNF

POSITION STATEMENT

TESTIMONY PRESENTED TO THE SENATE
EDUCATION, HEALTH, AND ENVIRONMENTAL AFFAIRS COMMITTEE

SENATE BILL 528 – CLIMATE SOLUTIONS NOW ACT OF 2022
Sponsor – Senator Pinsky, et al

February 15, 2022

DONALD C. FRY
PRESIDENT & CEO
GREATER BALTIMORE COMMITTEE

Position: Oppose

The Greater Baltimore Committee appreciates and supports the need to establish plans and standards to address the climate crisis. A collaborative approach between government, the private sector, and citizens is essential to meet the challenges being brought about by climate change. The GBC membership, comprised of businesses, nonprofit organizations, and educational institutions, recognizes that our institutions cannot thrive with ecological and public health problems brought about by our changing environment. Extreme weather disasters are becoming more frequent, imposing real costs on companies and the communities they help support. Climate change threatens facilities and operations, supply and distribution chains, and access to electricity and water. It can also impairs employees' access to employment and impacts customers from buying products or services.

Legislation passed in Maryland to address climate change should be ambitious but achievable, consist of an incremental framework that provides for significant greenhouse gas reductions over a reasonable period of time, and not impose excessive costs on businesses that can ill afford to meet the standards in the law or consumers of energy. Requirements should also not vary greatly from any federal requirements in order to prevent a patchwork of conflicting regulatory requirements. Provisions to provide generous financial assistance in the form of grants or low interest loans should be made available to businesses that are required to make costly investments in new technology. Unfortunately, Senate Bill 528 does not meet this description.

Senate Bill 528 calls for a 60% reduction in greenhouse gas emissions by 2030. Although this is a laudable goal, it would appear that requiring such a reduction may be an overreach based on the best advice provided from the state's own environmental agency.

Current state law calls for a 40% reduction in greenhouse gas emissions by 2030. Last year, an analysis by Maryland's Department of the Environment confirmed that a 50% reduction by 2030 was feasible, with some additional policy decisions. The pending legislation calls for increasing the current statutory reduction by one-half, an increase from 40%-60%.

According to data from the Center for Climate and Energy Solutions, a global climate policy think tank, setting the standard to reduce the state's greenhouse gas emissions at 60% would be one of the most aggressive measures in the country. Although laudable and ambitious, this may create a standard that is not achievable.

Senate Bill 528 requires the owner of any existing commercial and multifamily residential buildings that have a gross floor area of 25,000 square feet or more, excluding parking, to begin measuring and reporting its direct

emissions in 2025. Building owners would need to report a 20 percent reduction in net greenhouse gas emissions by 2030, a 40 percent reduction by 2035, and net-zero emissions by 2040.
For those buildings that cannot perform the required reductions, an unspecified fee would have to be paid for emissions exceeding the standards.

All new buildings would be prohibited from using natural gas or heating oil beginning in 2023. The legislation would also require all future construction to meet green energy code standards and cease fossil fuel hookups.

Natural gas is a critical fuel option for many Maryland based businesses. For years, businesses have relied heavily on natural gas to run their operations. Imposing restrictions on natural gas will likely lead to higher commodity cost. Reducing or removing accessibility to natural gas and forcing conversion to electric for commercial and industrial customers would present a considerable capital cost forcing businesses to invest significant funds to retrofit their operations.

The added cost of significantly altering business operations would jeopardize a company's ability to remain profitable and competitive. This would result in businesses looking to the state to subsidize the cost through financial assistance in the form of grants or low interest loans to meet the new state greenhouse gas standards.

The Greater Baltimore Committee believes that addressing climate concerns requires commitment from all parties, but the state must set reasonable and attainable goals and acknowledge realistic expectations regarding the cost of compliance for businesses. Commercial and industrial companies are important economic drivers and job creators in Maryland. Maryland businesses are still struggling from the effects of the COVID-19 pandemic recession, and adding costly new requirements too quickly could hamper economic growth and job creation.

The Greater Baltimore Committee report entitled Gaining A Competitive Edge outlines eight key pillars that promote economic growth and job creation. At least three of the pillars that are identified in the report are challenged by the passage of the climate control legislation as introduced:

1) **Government leadership that unites with business as a partner.**
   Maryland leaders must set a welcoming tone that communicates positive support for business, respect for the private sector as a partner, not an adversary, and reflects a strategic plan for business growth and job creation.

2) **Regulatory policies that are streamlined, stable, and predictable.**
   Maryland must project to businesses within and outside the state that its government regulatory policies are reasonable, relevant, free of surprises or redundancy, and considerate of businesses' sense of urgency.

3) **Competitive costs of doing business.**
   Public policies must reflect a government predisposition to nurture business growth and to avoid arbitrarily or disproportionately imposing additional overhead upon the business sector.

For the reasons set forth above, the Greater Baltimore Committee urges the Maryland General Assembly to give due consideration to the business competitiveness and cost concerns outlined above in the passage of climate change legislation. As such, the GBC respectfully requests that the Education, Health, and Environmental Affairs Committee report Senate Bill 528 unfavorably.

The Greater Baltimore Committee (GBC) is a non-partisan, independent, regional business advocacy organization comprised of hundreds of businesses -- large, medium and small -- educational institutions, nonprofit organizations and foundations located in Anne Arundel, Baltimore, Carroll, Harford, and Howard counties as well as Baltimore City. The GBC is a 67-year-old, private-sector membership organization with a rich legacy of working with government to find solutions to problems that negatively affect our competitiveness and viability.

Final Written Testimony of Washington Gas Light Co

Uploaded by: Dytonia Reed Reed

Position: UNF

1000 Maine Avenue, SW| Suite 700 | Washington, DC 20024 | www.washingtongas.com

TESTIMONY OF
THE
WASHINGTON GAS LIGHT COMPANY
BEFORE THE
COMMITTEE

FEBRUARY 15, 2021

SENATE BILL 528 – Climate Solutions Now Act

POSITION: OPPOSE

Washington Gas Light Company (Washington Gas) provides these written comments regarding Senate Bill 528, the Climate Solutions Now Act (SB528). SB528 seeks to further address climate change within the State of Maryland by requiring the State and its agencies to promulgate rules and take other actions that would require public and private actors to achieve net-zero statewide greenhouse gas emissions standards by 2045.

Washington Gas supports the overall goal of reducing greenhouse gas emissions and recognizes the scientific consensus that human activity – primarily greenhouse gas emissions and the conversion of land for agriculture and development – is contributing to changes in the global climate including changing weather patterns, rising sea levels and more extreme weather events. We believe that actions must be taken now to stabilize and reduce emissions. We are taking those actions.

Washington Gas also recognizes that we have a duty to support our customers and communities and to help the State develop and implement policies that help us provide affordable, safe, and reliable energy without restricting our customer's energy choices, including source. Natural gas is

an extremely affordable and reliable heating fuel available to residents and businesses in Maryland and many families and restaurants find it is a preferred option for cooking. Much of the recent success for the United States in addressing its climate impact in recent decades has been through the increase in use of natural gas as fuel input for power generation, displacing coal and oil.

A bit more about our background and focus. Washington was a small town when Washington Gas brought light to its first customer, the U.S. Capitol, in 1848. We have grown with this community ever since and care deeply about the 1.2 million customers we serve today, with over 500,000 customers in Maryland alone.[1] We deliver affordable energy to heat homes, cook food, and enjoy hot showers. This safe and reliable energy is easy to take for granted, but it is only available because of our over dedicated employees, including over 600 in Maryland, and our repeated investments to maintain a vast network of essential infrastructure. We are proud to be there for our customers and will continue to work every day to earn their trust and confidence. WGL is committed to meeting changing energy needs in a sustainable, low-carbon future.

Washington Gas hears the voice of policymakers in the State as it relates to climate change. We feel, however, that SB528 will strip our customers of energy choice, will have significant unintended consequences, and will pre-determine a pathway focused on policy-driven economy-wide electrification without adequate recognition of reliability, resiliency, and affordability.

This opposition to SB528 should not be understood to mean that Washington Gas is not actively taking concrete actions today to address decarbonization and is not fully ready to invest further in the pursuit of fuel neutral decarbonization pathways as emerging solutions and technologies continue to develop, mature, and become commercially viable. Washington Gas' role in a decarbonized future, we believe, is framed around four key areas – 1) end use and efficiency, 2) sourcing and supply, 3) infrastructure and operations, and 4) transportation.

Washington Gas is actively working on all these elements. For example, we continue to work to expand our work with Maryland customers on delivering household energy efficiency. We have also recently signed a novel contract with WSSC Water to advance an innovative bioenergy project. In addition, we have delivered certified natural gas to our customers during 2021. Finally,

[1] Washington Gas provides service to 506,791 residential and commercial customers throughout Prince George's, Montgomery, Calvert, Charles, Frederick, and St. Mary's counties.

we are working on options to further decarbonize our truck fleet, as well as working with other transportation fleet teams across our footprint to discuss new transportation solutions and alternative fueled vehicles.

OUR CONCERNS

Our primary concern with SB582 is the structural focus of the legislation on economy-wide electrification without understanding what this will mean for the affordability, customer choice, reliability, and resiliency of our customer's energy needs over time. We recommend that the legislation be modified to provide fair support for all potential decarbonization pathways, recognizing that technologies, markets, and solutions will continue to develop over the coming years and decades. As studies have found, a fuel neutral approach to decarbonization goals is often more affordable and provides a framework for a more reliable and resilient energy system.[2]

One specific issue with SB582 is the "*requirement that new buildings meet all water and space demand without the use of fossil fuels*" (Ln 1-3, pg. 35). Stated more directly, SB528 prohibits the use of fossil fuels, i.e., natural gas, in newly constructed buildings in the State in the very near-term. While the legislation at the highest policy level is focused on net-zero statewide greenhouse gas emissions by 2045, this explicit restriction goes beyond this goal and forces businesses and private actors to lose energy choices that they may find valuable for their enterprise and organization. And which may be a more affordable and cleaner solution.

Maryland residents, current and future, want energy choices. More than 40% of Maryland homes today rely on natural gas.[3] According to recent polling, 66% of Marylanders prefer to continue using natural gas.[4]

[2] AGA Study on Baltimore Electrification Customer Impacts https://www.aga.org/contentassets/6628ffb835194ba1b89a0bb2ebc3b8a2/md-grounded-in-reality_exec-summary.pdf

[3] Consumer Energy Alliance, pg. 2 https://consumerenergyalliance.org/2022/01/forced-electrification-could-cost-maryland-consumers-more-than-26000-per-household-new-cea-report-finds/

[4] Public Opinion Strategies conducted a statewide poll surveying 600 Marylanders across the state from January 22, 2022 through January 26, 2022.

This bill's directive to prohibit the direct use of natural gas and require building electrification for all growth and development may have an unintended effect of increasing in the near-term emissions given that largest source of electricity used in the State of Maryland is derived from power plants burning natural gas to generate electricity.[5] Washington Gas offers that the direct use of natural gas on-site for heating and hot water is far more efficient that using natural gas to generate electricity, transmit through the transmission and distribution system, and then use that energy for electric resistive or heat pump space heating. If this bill passes, there will need to be significant investments in the power supply infrastructure to serve Maryland, without any consideration for reliability and resiliency. Moreover, it will cause an increase in electricity generated by out of state natural gas or other fossil fuels power plants providing no local job benefit and potentially cause an increase in greenhouse gas emissions.

SB528 also establishes new building emissions standards that require commercial or multifamily residential buildings with a gross floor area of 25,000 square feet or more that directly produce emissions onsite to reduce their net greenhouse gas emission by 20% on or before January 1, 2030.[6] While the bill provides for an alternative compliance plan, those operating under an alternative compliance plan will be subject to a "*fee"* (Ln. 27-29, pg. 47) that is akin to a tax on customers.

Washington Gas supports policies that promote energy resiliency and sustainability by leveraging the reliability of the current natural gas delivery system. Phasing out natural gas will require an increase in electricity production and transmission as buildings consume more electric power for their heating systems. Thus, this natural gas ban may simply shift emissions rather than reducing them. Unfortunately, SB528 does not provide the flexibility, nor does it support technological innovation to reduce emissions through focusing on proven solutions like modernization of our physical infrastructure.

For instance, our Strategic Infrastructure Development and Enhancement Plan (STRIDE) program has accelerated pipeline replacement. This ongoing pipeline replacement project has enhanced safety and reduced emissions throughout our service territories. As of 2018, Washington Gas has reduced state GHG emissions by 32,000 metric tons because of these infrastructure enhancements.

[5] https://www.pjm.com/markets-and-operations.aspx

[6] The bill applies to *"covered buildings not owned by the State"* defined as a commercial or multifamily residential building with a gross floor area of 25,000 square feet or more that directly produces emissions on site. (Ln 29-31, pg. 23). This bill is limited to commercial and multi-family units.

The reduction in 32,000 metric tons of carbon emissions is the equivalent to 6,959 fewer vehicles on the road.[7]

Washington Gas would also support this Committee working together to promote efforts to decarbonize the energy supplied through our distribution network. There are two ways to reduce emissions associated with natural gas supply. The first is introducing low/no carbon non-fossil-based gases into the natural gas delivery system. For instance, renewable natural gas (with feedstocks from municipal solid waste landfills, wastewater from treatment plants, livestock farms, food production facilities and organic waste management operations) and green hydrogen are options that have strong decarbonization potential. They also require no action on the part of customers to implement and bring to scale. The second is to avoid methane emissions from upstream natural gas extraction. This involves sourcing natural gas from higher quality producing firms. These technologies and options will be imperative as Maryland moves to a cleaner future. And are available today to our customers. Washington Gas looks forward to working with the Legislature to seek to bring additional cleaner supplies to its customers.

CONCLUSION

Washington Gas works every day to earn our customers trust and confidence. We support the overall goal of reducing greenhouse gas emissions. We believe the best option is to support a fuel neutral decarbonization pathway that allows for the benefits of the entire energy system to be brought to bear on resolving sustainability goals, while also considering affordability. Washington Gas strongly objects to policies which reduce customer choice and mandate electrification. We will remain focused on ensuring energy security – reliability and resiliency – in any policy change. We are confident that there is a path forward, but do not see that SB528, as drafted, is the right approach.

Dytonia "Dy" Reed, Esq., State Government Relations and Public Policy Manager
M 202.379.6993 | dytonia.reed@washgas.com

[7] According to the Environmental Protection Agency's carbon emission calculator. Found here: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

SB 528--AOBA Statement--UNF.pdf
Uploaded by: Erin Bradley
Position: UNF

MARYLAND EDUCATION, HEALTH AND ENVIRONMENTAL AFFAIRS COMMITTEE

TESTIMONY IN OPPOSITION TO SB 528, THE CLIMATE SOLUTIONS NOW ACT OF 2022

FEBRUARY 15, 2022

The Apartment and Office Building Association of Metropolitan Washington ("AOBA"), on behalf of its members who own or manage approximately 20 million square feet of commercial office building space and approximately 60,000 multifamily residential building units in Montgomery County, Maryland,[1] hereby respectfully submits its opposition to Senate Bill 528, The Climate Solutions Now Act of 2022.

Over the past decade, growing concerns about climate change have led numerous organizations and think tanks to research how jurisdictions across the nation can achieve large reductions in greenhouse gas (GHG) emissions. These research efforts have noted that making existing buildings more energy efficient is critical to lowering a jurisdiction's carbon emissions. Energy efficiency also has other positive effects, such as lowering energy bills for customers and property owners alike, reducing air pollution, and creating jobs. Recognizing these benefits, our members have taken steps over the previous decade to make efficiency upgrades to aspects of their properties, including windows, insulation, appliances, toilets, and showerheads, among others. While AOBA broadly supports efforts to reduce GHG emissions and curb the effects of climate change, SB 528 mandates unrealistic GHG reduction goals on commercial and multifamily property owners that will have unintended consequences for housing affordability and energy availability.

Broad Regulatory Authority and Aggressive Emissions Targets Have Unspecified Cost for Building Owners and Operators

The Climate Solutions Now Act sets two emissions targets: a 20% reduction in net GHG emissions by 2030 and a 40% reduction by 2035, with required reporting of direct emissions to the Department annually beginning in 2025. The Act also grants broad discretion to the Department of Environment to promulgate any regulation deemed necessary to advance these goals. The wide discretion granted to the Department comes with almost no direction or limits. As a result, the cost to property owners and operators to comply with future regulations could be enormous and both

[1] In Maryland, AOBA Members own, manage or control approximately 23 million square feet of commercial office space and approximately 133,000 multifamily residential building units. In the Washington, D.C., Maryland and Virginia metropolitan area, the total numbers for AOBA Members are approximately **185 million square feet** of commercial office space and more than **400,000 residential units** in the **District of Columbia, Maryland, and Virginia.**

economically and physically unworkable. Additionally, the bill does not direct the Department to work in tandem with property owners and operators to develop these regulations.

Moreover, it is unclear whether the bill's targets are feasible or what the overall economic cost would be. A cost-benefit analysis of the potential energy savings, absent the "societal cost of carbon" is necessary to understand the pure economic impact of the bill. Otherwise, the state will head into this process blind to whether these aggressive targets can be reached.

The Cost, Viability, and Desirability of Full Grid Electrification and Intermittent Energy Source Reliance are Open Questions.

Such an analysis should include an assessment of the ability of the state's power grid to handle full electrification and whether the reliability concerns regarding intermittent renewable energy sources can be properly mitigated. It is far from certain that the grid, which is comprised of Baltimore Gas and Electric, Washington Gas, and Pepco systems, can handle such a massive change on the scale called for by SB 258 and still reliably provide power regardless of severe weather events. As seen in Texas this past winter[2] [3] and California almost annually[4], an overreliance on wind and solar energy can result in insufficient energy production to meet demand, leading to massive blackouts. This risk has not been properly assessed.

Maryland's net electricity generation from October of 2021 was produced through five sources generating 3478 MWh: natural gas (45%), nuclear (38%), coal-fired (8%), Hydroelectric (5%), and nonhydroelectric renewables (4%).[5] Renewables only produced 9% of the state's electricity during that time. Full electrification would mean in the short term more coal and natural gas must be burned to generate the power necessary to serve this load. Moreover, the question remains about what to do with the underground infrastructure of Washington Gas and Baltimore Gas and Electric that will no longer be needed. Do we remove this infrastructure and if so, who will cover the cost of removal?

Additionally, SB 258 does not consider technological advances to natural gas that make this energy source more efficient, such as Certified Gas (CG) and Renewable Natural Gas, or the potential to increase hydrogen energy production. Certified Gas involves extracting natural gas in a manner that reduces emissions by 60-80%, while Renewable Natural Gas is carbon neutral and provides GHG emissions reductions without the need for equipment upgrades.[6] Hydrogen is also renewable and a versatile source of energy that can be used for transport, heating, and electricity. None of these sources are acknowledged by this legislation.

SB 258 Places Property Owners and Operators in No-Win Situation

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[2] https://www.sciencedirect.com/science/article/pii/S2214629621001997

[3] https://www.wsj.com/articles/texas-spins-into-the-wind-11613605698?mod=opinion_lead_pos1

[4] https://www.reuters.com/business/energy/californias-clean-grid-may-lean-oil-gas-avoid-summer-blackouts-2021-08-11/

[5] https://www.eia.gov/state/?sid=MD#tabs-4

[6] Washington Gas Climate Change Action Program, Part 1. December 15, 2021. https://washingtongasdcclimatebusinessplan.com/wp-content/uploads/2021/12/Climate-Change-Action-Program-Part-1-12.15.21.pdf

SB 258 would mandate property owners and operators reduce the GHG emissions of their buildings by 20% within 5 years. As discussed above, the state's electric grid may not be capable of producing reliable electricity in a way that reduces GHG emissions enough to reach the proposed goals. In addition to this clear impediment, the retrofits necessary to reach full electrification and reduce property emissions would be substantial. AOBA members have already made upgrades available that reduce building emissions, such as switching to more efficient lighting systems, insulating windows, and installing energy-efficient appliances like refrigerators and microwaves. As such, compliance with the proposed requirements would require far more expensive changes like replacing current boilers with dual-energy heating systems, chiller upgrades, or comprehensive retrofit projects that can range from $14 million to $36 million, as noted by projects connected with Washington, DC's Sustainable Energy Utility (SEU).

Replacing boilers with fully electric versions presents its own specific challenges. Current electric boiler technology cannot heat water at the rate traditionally consumed. Beyond that issue, some properties, like 1980's garden-style apartment properties, cannot be retrofitted with electric boilers without razing the entire building. The same is true for other comprehensive retrofit projects, which make these changes incredibly expensive to complete. It is important to note that these types of properties are offering the State's naturally occurring affordable housing.

Even if these retrofits can be completed, the bill does not incentivize residents to adopt effective energy conservation practices. It makes little sense to create a BEPS program if the resulting efficiency benefits can be undermined by the wasteful energy habits of residents. Without the active commitment from both commercial building occupants and multifamily building residents, the GHG reduction goals of the bill will not be achieved.

These concerns, taken together, point to the possibility of increased future housing costs for Maryland renters. These retrofits come with high costs in terms of labor and capital that would place upward pressure on rents, especially in unsubsidized older market-rate housing, much of which makes up the state's affordable housing stock. Approximately 91% of rent collected goes toward the cost of maintaining, managing, and operating the property and paying real estate taxes. Unlike other types of businesses, housing providers cannot balance losses with other revenue categories. Spikes in operating costs that are either unexpected or incredibly high may only be managed through an increase in rent, a reduction in services to residents, or deferring planned capital improvements.

HB 258, while well-intentioned, has flaws that need to be addressed. Passing such broad and vague legislation means the state will embark on a process to meet aggressive GHG emissions reductions goals blind to the overall cost borne by property owners, renters, the state, and the wider public. These costs need to be properly analyzed, without consideration of vague social benefits of carbon reductions, which can skew any cost-benefit analysis with benefits that don't directly result from the proposed energy reductions. The bill in its current form could result in astronomical costs being borne by property owners, with implications for housing affordability and potentially without leading to the GHG emissions the legislation seeks to create.

For these reasons, AOBA opposes SB 258 and urges a cost-benefit analysis to be conducted.

Jason Ascher - Oppose - SB 528 - Climate Solutions
Uploaded by: Jason Ascher
Position: UNF

MID-ATLANTIC PIPE TRADES ASSOCIATION

PLUMBERS - STEAMFITTERS - SPRINKLER FITTERS
PIPE FITTERS - PIPE WELDERS - HVAC SERVICE TECH

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Senate Education, Health, and Environmental Affairs Committee

To: Senator Pinsky, Chair; Senator Kagan, Vice Chair; and Members of the Committee.
From: Jason Ascher, Political Director, Mid-Atlantic Pipe Trades Association – United Association of Plumbers and Steamfitters

OPPOSE SB 528 – Climate Solutions Now Act of 2022

On behalf of the Mid-Atlantic Pipe Trades Association, our five United Association of Plumbers and Steamfitters Locals, and our over 10,000 members plus their families across all corners of Maryland, I ask you to **OPPOSE SB 528**.

As an organization whose members build and service fossil fuel infrastructure, this legislation will irrevocably harm the careers of many of our members. These workers have been earning good family-sustaining wages with benefits for, in some cases, decades. They have been working hard, paying their taxes, and taking care of their families without the need for public assistance programs. Their work has ensured that taxpayers across Maryland can turn lights on in their homes, have hot water, and have heat in the cold winters. These members come from diverse backgrounds, such as immigrants from around the world, returning citizens, and some whose membership is a family tradition. Many of these workers will tell you these careers changed their life. Now, this legislation threatens their careers and the livelihood of their families. It does this without a care for what happens to them. These members trained for five years to be the most skilled pipefitter in the industry, their training was at no cost to them or the taxpayers, and they earned wages and benefits that reflect that training. Unrelated to this specific legislation, any discussion in the past of "just transition" has not considered these wages and benefits.

In removing fossil fuel piping systems from commercial or residential construction, you limit the end user's ability to heat a building or the water entering the building quickly and efficiently. With the problems seen across the state the past few winters with schools closing because the heat doesn't work, there is a great need to upgrade our schools. The Built to Learn Act of 2020 will help with that but leaving out gas lines to heat the building and water would be detrimental to the children in the school.

The other piece of the assault on my member's jobs is limiting the renewable energy options available to meet the goals in this legislation. This part is where a "just transition" goes off the rails. Carbon Capture, Nuclear, Natural Gas, Hydro, and Geothermal are energy sources with large quantities of piping. Only some of these are willing to pay the family-sustaining wages and benefits our members earn. Other renewable options such as Rooftop Solar and Wind (except for the offshore wind) look to build their infrastructure as cheap as possible, and they do this by paying low-wage workers to do the job. Nuclear and Carbon Capture needs to be added as Tier 1 renewables because they are the only way you will quickly replace coal and gas to meet the goals of this legislation. Wind and Solar have the least infrastructure to aid in the transition. Before you end fossil fuels and stop installing its infrastructure in new construction and remodels, build more of this renewable infrastructure; otherwise, you put grid stability in danger. As of this moment, as I write this, renewable energy sources are creating 11,547 MW of a total 113,575 MW on the PJM grid (PJM App at 9:30 am on 2/9/22). Currently, the infrastructure doesn't exist for renewable energy to replace fossil fuels without nuclear added as renewable. As of January of 2020, the country of Denmark, the world leader in wind power, only gets 47% of its energy from the wind after building infrastructure for 40+ years (Reuters 1/2/2020, *Denmark sources record 47% of power from wind in 2019*).

Finally, I return to the just transition. There is nothing "just" about transitioning workers to a lower-paying job with minimal benefits. The last thing a 50–55-year-old who is 10-12 years from a hard-earned retirement wants to hear is they will be retrained for a lower-paying job that will hurt this retirement. As an organization, the United Association of Plumbers and Steamfitters sells a product. This product is a highly trained, skilled, and certified worker for plumbing and pipefitting. Our programs will handle transitioning our members, we just need to know what that transition is so we can adjust our training program, and we will do it without taking a dime from the state to fund the training. This legislation does not layout where that future is, and the workgroup it creates for the "just transition" does not include us. While members of the labor community are part of this workgroup, there is no representation for our members who will lose jobs in significant numbers.

For these reasons I ask you to **OPPOSE SB 528**

SB 528 Climate Solutions Act of 2022.pdf
Uploaded by: Jeffry Guido
Position: UNF

May 14, 2021

Electrical Workers
Insulators
Boilermakers
United Association
Plumbers & Gas Fitters
Sprinkler Fitters
Steam Fitters
Roofers
Cement Masons
Teamsters
Laborers
Bricklayers
Ironworkers
Sheet Metal Workers
Elevator Constructors
Painters
Operating Engineers
Carpenters

Maryland Senate Education Health & Environmental Affairs Committee

Chair: Paul G. Pinsky

Vice Chair: Cheryl Kagan

Senate Bill 528 Climate Solutions Now Act of 2022

Position: **OPPOSE**

The Baltimore DC Metro Building Trades Council Opposes Senate bill 528 for the following reasons. There are no labor standards required under the Just Transitioning and Retraining language in the bill. As our tax dollars are being spent the application of these standards are imperative to protection of the living standards and empowerment of Maryland's working families. These standards include paying the area prevailing wage standard for each trade, including the wages and fringe benefits per trade, and be subject to all state reporting and compliance requirements. Participation in an apprenticeship program registered with the State of Maryland for each trade employed on the project. Contractors that have been compliant with federal and state wage and hour laws in the previous three years. The establishment and execution of a plan for outreach, recruitment, and retention of Maryland residents to perform work on the project—including residents who are returning citizens, women, minority individuals, and veterans—with an aspirational goal of 25 percent of total work hours performed by Maryland residents, including individuals in one or more of the groups identified. The solar and wind energy industry does not provide, currently, family sustaining wages and benefits comparable to employment in the nuclear, natural gas, fuel oil or coal industry. Our members are certified and licensed skilled crafts persons that install these systems safely and economically. Maryland's renewable energy in the form of hydroelectric, solar, wind and biomass only provides 11% of Maryland's energy use, 75% of which is imported. Nuclear energy and Natural gas provide 79% with 41% and 38% respectively and coal accounts for 9%. Solar and wind have not reached a capacity to replace this reliable on demand energy. As a less carbon (not carbon less) future is inevitable the Baltimore DC Building Trades leads the State in green energy construction training though our apprenticeship and journey person programs. Net zero school construction grants should be applied through the Inter Agency Commission as eligible costs and comply with prevailing wage threshold amounts for school construction.

We ask the committee for an unfavorable vote. Thank you.

Respectfully, Jeffry Guido -Baltimore-DC Metro Building Trades Council

Value on Display... Everyday.

SB528- Climate Solutions Now Act of 2022.pdf
Uploaded by: Kristi Simon
Position: UNF

Central Maryland Chamber
The Center of Intelligent Business

February 11, 2022
Honorable Guy Guzzone, Chair
Senate Budget & Taxation Committee
3 West Miller Senate Office Building
Annapolis, MD 21401

Senate Bill 528- Climate Solutions Now Act of 2022
Legislative Position: Unfavorable

Dear Chairman Guzzone and Members of the Committee,

The Central Maryland Chamber of Commerce (CMC) was formed in 2017, a merger of two existing chambers- The Baltimore Washington Corridor Chamber (originally founded in 1948) and the West Anne Arundel County Chamber (originally founded in 1962). The CMC is a regional organization representing approximately 350 businesses in the Central Maryland corridor and exists to be the primary business resource and advocate as the area experiences exponential growth.

The Central Maryland Chamber is writing to oppose SB528.

SB528 seeks to mandate the total phase-out of energy sources such as propane, heating oil and national gas for residential and commercial buildings by 2040 and rushes the existing 2030 goal for 20% greenhouse gas emission 5 years earlier than previously scheduled.

While we agree with the need to reduce greenhouse gas emissions, this bill is unattainable, incredibly costly, and removes predictability for standards previously put into place. The prior targets and timelines are already costly but moving the target pushes incredible responsibility and expense onto businesses.

These are incredibly expensive structural changes and industry representatives report there are not enough advancements in technology or experienced workers to even accomplish such a goal. The costs of this requirement do not just impact businesses and commercial building owners, but individual homeowners as well.

The requirement that commercial buildings must measure and report greenhouse gas emissions to the Maryland Department of the Environment starting in 2025 is also complicated. In a short timeframe, businesses will need to support the cost of additional reporting, staff, or subcontractors to do the work of measurement, reporting and communicating with the state, with the burden on the department to manage such an incredible amount of reviews and communication, verification of accuracy, implementation of violations and much more.

Instead of creating new cost burdens for all Marylanders, both residential and commercial, with something so broad and far reaching, please focus on finding ways we can achieve the existing greenhouse gas goals without moving the target and driving up energy costs which are already crippling the community.

The Central Maryland Chamber requests that you vote unfavorably on HB496.

NAHB Resolution.pdf
Uploaded by: Lori Graf
Position: UNF

Resolution No. _1

Date: 2/10/2022
City: Orlando, FL

NAHB Resolution

Title:	NAHB Support for Housing and Climate
Sponsor:	Home Builders & Remodelers Association of Massachusetts
Submitted by:	Gary Campbell

WHEREAS, federal and state governments and policymakers at all levels are considering or taking steps to reduce the amount of carbon emitted into the environment and many have targeted housing as a contributor to atmospheric carbon emissions;

WHEREAS, to do so, to date, 34 states have released a climate action plan or are in the process of revising or developing one; many states are moving toward the development of "net zero" or "net zero ready" energy codes for new and remodeled buildings; and individual communities throughout the country are attempting to ban the use of natural gas in new and renovated buildings in favor of fully electrified homes;

WHEREAS, safe and affordable housing is of fundamental importance to the lives of all citizens and future generations of Americans and a cleaner environment is beneficial for the health and safety of all;

WHEREAS, there is a growing disparity in homeownership rates and affordability nationally between whites and non-Hispanics (73.3%) Hispanic Americans (47.5%) and Blacks (42.1%);

WHEREAS, the National Association of Home Builders (NAHB) stands for the ability of all Americans to be able to access safe and affordable housing;

WHEREAS, the imposition of heightened building codes and electrification requirements will increase the costs of residential construction, which will negatively impact the affordability of housing; and

WHEREAS, negative impacts on housing affordability will further exacerbate the existing national housing crisis that already disparately impacts communities of color throughout the Country,

NOW, THEREFORE, BE IT RESOLVED that the National Association of Home Builders (NAHB) urge the federal and state governments to:

1. Quantify the cost implications of each element of any code changes needed to reach "Net Zero" and/or "Net Zero Ready" for all housing types;

2. Assess the aggregate impact of all Net Zero and/or Net Zero Ready code changes on housing affordability and housing production;
3. Implement cost-mitigative programs simultaneously with any Net Zero and/or Net Zero Ready code changes that will, at a minimum, off-set the aggregate increased costs of construction; and
4. Forego adoption of any Net Zero and/or Net Zero Ready code changes that are not accompanied by cost-mitigative programs that fully offset the increased costs to housing construction.

BE IT FURTHER RESOLVED that NAHB urge federal, state and local governments and policymakers as well as utility services, finance, insurance, appraisal and related real estate industries to aid in minimizing the cost impact of Net Zero requirements on all housing types by:

1. Directing that all Freddie Mac, Fannie Mae, and all other federally-backed and state-backed mortgages be underwritten to account for consumer energy utility savings resulting from Net Zero and Net Zero Ready increased code requirements, and include a corresponding increase in consumer "buying power" by fully accounting for such energy utility savings;
2. Establishing market driven initiatives to facilitate the transition to Net Zero and Net Zero Ready new and remodeled housing;
3. Creating grant and low interest loan programs, tax rebates, tax credits rebates or other funding mechanisms to offset any cost increases to assist new home buyers and existing homeowners in securing affordable housing or transitioning existing homes to meet higher energy standards; and
4. Creating grants, tax rebates, and other incentives to help home builders, remodelers and developers offset cost increases and encourage the construction of Net Zero and/or Net Zero Ready homes.

Leadership Council Action:
Resolutions Committee Action:
Land Development Committee:
Construction, Codes & Standards Committee Action:
Custom Builders Committee Action:
Housing Finance Committee Action:
State & Local Government Affairs Committee Action:
NAHB Remodelers Action:
Environmental Issues Committee Action:
Federal Governmental Affairs Committee Action:
Single Family Builders Committee Action:
Multifamily Council Board of Trustees Action:
Energy & Green Construction Codes & Standards Subcommittee
Of the Construction, Codes & Standards Committee Action:

SB 528_Climate Solutions Now Act of 2022_UNFAV.pdf
Uploaded by: Maddy Voytek
Position: UNF

MARYLAND
Chamber of Commerce

LEGISLATIVE POSITION:
UNFAVORABLE
Senate Bill 528
Climate Solutions Now Act of 2022
Senate Education, Health, and Environmental Affairs Committee

Tuesday, February 15, 2021

Dear Chairman Pinsky and Members of the Committee:

Founded in 1968, the Maryland Chamber of Commerce is the leading voice for business in Maryland. We are a statewide coalition of more than 5,500 members and federated partners, and we work to develop and promote strong public policy that ensures sustained economic recovery and growth for Maryland businesses, employees, and families.

SB 528 is an extensive and dense piece of legislation proposing major changes to Maryland's policies relating to the emission of greenhouse gas. Despite the many different and worrisome proposals, the Maryland Chamber of Commerce has a few primary concerns with SB 528 as introduced:

1. Maryland's existing climate plans are required to achieve a greenhouse gas reduction target while simultaneously increasing jobs and economic benefits. The current plan meets that standard and is therefore a win-win for Maryland. SB 528 changes the current standard by modifying the net benefit test to compare proposals to "no-action" by the rest of the world. By comparing jobs and economic impacts to a global climate catastrophe than any measure, no matter how draconian, will be a positive.

   SB 528 essentially eliminates the requirement that the plan result in a net economic benefit to the State's economy and a net increase in jobs.

2. The GHG reduction goals outlined in SB 529 are more stringent than those recommended by the Biden Administration or international organizations such as the United Nations. The net-zero goals by 2050, which have been widely accepted, has been used by the private sector in sustainability plans almost exclusively. SB 528 does no more than move the goal post on targets that have been the basis of GHG reduction plans across the State.

3. This legislation calls for expensive requirements for new and renovated commercial buildings. SB 528 requires MDE to adopt new building codes by January 1, 2023, forbidding the use of fossil fuel for heating and hot water. Further, the "cost-effectiveness waiver" in the bill will likely be a rare occurrence due to the "cost' vs "social cost" calculation. With an extraordinarily quick adoption time, a waiver system that is unlikely to be used, and a total lack of retrofit incentives to offset costs, SB 528 is setting commercial buildings up for compliance failure.

4. Further, SB 528 imposes a building tax on existing commercial buildings for those that are unable to reduce their carbon emissions by schedule outlined in the legislation. The fee for this tax will be at least $51 per ton. For a sector that is under enormous pressure from the economic fallout of COVID-19, levying an additional tax will only further harm anemic recovery.

SB 528 creates significant challenges for existing businesses and future economic development in Maryland. This legislation effectively removes the consideration of economic impact from the State's GHG reduction plans. It requires costly retrofits and upgrades on commercial buildings without any means of offsetting costs or providing incentives. It adds a new tax on businesses and upends many corporate GHG reduction and sustainability plans by setting goals out of line with our federal government and international organizations. Finally, it places Maryland at a significant regional economic competitiveness disadvantage. SB 528 ultimately phases out the use of other affordable energy sources that are critical to every jurisdiction in our State.

For these reasons, the Maryland Chamber of Commerce respectfully requests an **unfavorable report** on SB 528.

Testimony in Opposition of SB 528.pdf
Uploaded by: Michael Canales
Position: UNF

Plumbers Local Union No. 5
United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada, AFL-CIO
5891 Allentown Road, Camp Springs, MD 20746 • Telephone: (301) 899-7861 • Fax: (301) 899-7868

Senate Education, Health, and Environmental Affairs Committee
Feb. 15, 2022

To: Senator Pinsky, Chair; Senator Kagan, Vice Chair; and Members of the Committee.
From: Michael Canales, Plumbers and Gasfitters Local #5 Member and Business Representative

OPPOSE SB 528 – Climate Solutions Now Act of 2022

On behalf of the Plumbers and Gasfitters Local #5 and our over 1,800 members plus their families across all corners of Maryland, I ask you to **OPPOSE SB 528**.

As an organization whose members build and service Natural Gas infrastructure, this legislation will negatively impact the careers of many of our members. Our members have been earning good family-sustaining wages with benefits since our inception in 1890. We have been working hard, paying our taxes, and taking care of our families without the need for public assistance programs. Our work has ensured that taxpayers across Maryland can turn lights on in their homes, have hot water, and have heat in the cold winters. Our members come from diverse backgrounds, such as immigrants from around the world, returning citizens, and some whose membership is a family tradition. Many of these workers will tell you these careers have changed their life, mine included. Now, this legislation threatens their careers and the livelihood of their families. Our members train for five years to be the most skilled Plumbers and Gasfitters in the industry, their training was at no cost to them or the taxpayers, through our self-funded apprenticeship and training programs and they earn wages and benefits that reflect that training.

Respectfully submitted,

Michael Canales
Business Agent / Organizer
Plumbers & Gasfitters Local 5

SB 528 testimony for NAIOP (2a).pdf
Uploaded by: Michael Powell
Position: UNF

GORDON·FEINBLATT LLC
ATTORNEYS AT LAW

SB 528

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BALTIMORE, MD 21202-4346
410.576.4000
www.gfrlaw.com

February 14, 2022

VIA EMAIL
The Honorable Chairman Paul Pinsky
Maryland Education, Health, and Environmental Affairs
Miller Office Building
Annapolis, Maryland 21401

Re: **SB528 - Climate Solutions Now Act**

Dear Senator Pinsky:

NAIOP requests an unfavorable report on Senate Bill 528.

NAIOP supports the adoption of reasonable strategies and responsible, technically sound regulations designed to reduce greenhouse gases on schedules and using methods that minimize economic disruption and result in an orderly energy transition for buildings and tenants. Unfortunately, Senate Bill 528 calls for measures that go too far, too fast and will cause significant harm to an important sector of our economy; a sector which is already under great stress.

All-Electric Building Code

SB 528 calls for building codes to ban new fossil fuel hookups for heating and hot water by January 1, 2024. This is simply too fast. Many projects that have been in development for lengthy periods as they navigated a way through zoning approvals or pandemic supply problems will be disrupted. If the Committee decides to adjust building codes, then the change should allow more time for the transition and a grandfathering provision for projects that are in the pipeline.

Large commercial buildings, in particular, face unique challenges. Many types of large structures may be unable to make the transition to all-electric heating without the development of new technologies and engineering improvements. The adoption of new building codes needs to allow time for those advancements to occur.

Any transition should also have a less strenuous test for waivers. The bill calls for a test that weighs the lifetime cost of fossil fuel plus a lifetime "social cost" of at least $51 per ton of

carbon against the cost of constructing a building that solely uses electricity for hearing and hot water. That "social cost" is variable and has already been changed multiple times by EPA. Very few, if any, buildings will pass this test, but buildings vary greatly in size and purpose.

The waiver provision fails to recognize differences in the technical feasibility of converting to all-electric regardless of the size and function of the building. It is much easier, for example, to heat a single-family home with a heat pump than to heat a large commercial warehouse with the same technology. The cost effectiveness waiver, or the underlying building code, should recognize the differences among building types. To put it simply, more flexibility is needed in drafting building codes to allow waivers.

Any ban on new hookups should include a later deadline, a grandfathering exception, and more flexibility in the provisions of building codes and waivers.

Carbon Tax for Existing Buildings

The bill calls for a large carbon tax on existing buildings without providing any incentives or tax credits to help offset the enormous cost of compliance.

When the Maryland Commission on Climate Change developed their Building Transition Plan, the Commission stressed the need for new incentives such as grants or tax credits to help offset the cost of retrofitting existing buildings and reduce the payback periods. This is essential because a think tank hired by MDE estimated the cost of the HVAC equipment, building and grid upgrades needed to reach the net-zero goal of the bill's "high electrification" scenario was between $7,700,000,000 and $14,000,000,000 per year (see chart at end). Seven to fourteen billion (with a B) dollars, without offsetting incentives and credits, would devastate the commercial and multi-family residential building sectors.

SB 528 recognizes that incentives are necessary by awarding twelve million dollars a year to public schools to support their efforts to improve emissions – even though the Bill imposes far fewer, and less expensive, requirements on public schools. No money is dedicated to any other covered buildings. Even buildings such as senior citizen retirement homes, hospitals and private schools would not receive any assistance. Instead, the Building Energy Transition Implementation Task Force is expected to make recommendations for incentives that may, or may not, be adopted in the future. The Bill does not even dedicate the fees collected to grants assisting building owners in meeting the requirements.

Instead of providing assistance, SB528, utilizes an entirely punitive approach where an escalating tax punishes any building which fails to reduce emissions in the next eight years and then increases the tax five years after that and a second increase five years after the first increase. The thin reed of a possible recommendation for incentives during some future session is inadequate. The building tax should not be adopted without a simultaneous adoption of a system of incentives – just as the bill proposes for public schools.

The tax requires every covered building to reduce emissions by 20% compared to 2025 regardless of where the building's emissions started. This has the adverse impact of requiring

buildings that start with low emissions to make more expensive changes than buildings that start with high emissions. An all-electric building will have difficulty achieving a 20% or 40% reduction from existing levels where an older building with oil boilers, for example, may be able to spend less.

In addition to a lack of offsetting incentives, the Bill sets an implementation date earlier than recommended by the Maryland Commission on Climate Change. The Commission had recognized that as part of any move to all-electric buildings, the PSC would need to develop a Utility Transition Plan which would include electric system enhancements, additional demand management during winter peaks, and ratepayer protections. Most importantly, the Commission called for any Building Transition to include studies to identify "locations where the grid is not sufficient to serve new construction of multi-story, all-electric commercial buildings with electric vehicle charging and a method to determine the cost and timetable for necessary upgrades." Obviously if parts of the grid cannot sustain new all-electric buildings, then it may not sustain the wholesale retrofitting of existing buildings. The bill should allow time for the PSC to complete those studies before forcing all new buildings to connect to the grid.

SB 528 adopts a tax system that charges ahead with building mandates without these additional provisions that would assist building owners with the cost of retrofitting and without the necessary studies to assure that the electric grid would support the transition

New Emission Targets

Any approach to climate change must begin with a focus on the science. That science has been well studied by of the United Nations Intergovernmental Panel on Climate Change (IPCC), the EPA and the Maryland Commission on Climate Change. Unfortunately, SB528 calls for reductions on a schedule that is much faster, and therefore more disruptive, than called for by those agencies. The IPCC recommended that countries achieve a 45% reduction by 2030. The Biden Administration has called for countries to reduce greenhouse gases by 50 to 52% by 2030. The Maryland Commission on Climate Change – a commission established by the General Assembly to provide advice on exactly this issue, studied the issue in detail and recommended that the Assembly adopt a target for 2030 of 50% compared to 2006 levels. The Commission also recommended that the target date for building "decarbonization" be 2045 in recognition of the cost and difficulty involved in retrofitting buildings.

Despite those recommendations of a reduction target of 50%, SB 528 calls for a 60% reduction. Instead of a 2045 target for buildings to reach net-zero, SB 528 establishes a 2040 deadline.

The changes in percentages and dates are not trivial. Any "low hanging fruit" for greenhouse gas reduction has already been exhausted. Each additional percentage of reduction or shortening of the time allowed to reach that reduction will come with escalating economic pain. Allowing the reductions to be phased in over a more reasonable period will reduce the disruptions and allow time for workers to retrain and businesses to retool. The goals cannot be achieved by

simply closing coal plants – all Maryland coal plants have announced dates by which they will stop burning coal – the reductions will need to be made where individual citizens live and work.

In addition, many of the greenhouse gas reductions that are called for by SB 528 will strain Maryland's electric grid. The common thread of most of the bill is to replace fossil fuels with electricity from 100% renewable sources. *If* that can be done (and there is reason for doubt) then it must be done carefully to balance the demands with available supply and capacity. Forcing *all* buildings to electrify *all* heating systems while simultaneously moving toward *all* electric vehicles will not merely increase overall demand but change the ways in which power flows across the grid and the times and days when peak demand occurs. For example, peak demand is likely to change from hot, sunny, summer days to cold, snowy, winter days. At the same time, fossil fuel plants, which can produce power regardless of weather or time of day, will be replaced by renewable plants that only produce power when the sun shines or the wind blows.

The Power Plant Research Program of DNR is currently conducting the study mandated by the General Assembly in the Clean Energy Jobs Act of 2019 on the feasibility, costs, and benefits of a 100% renewable power standard and to evaluate the transition needs for impacted industries and communities. SB 528 mandates the transition on a set schedule before the Program has completed the legislatively mandated study on feasibility and timing.

There are ample reasons to doubt whether this transition can be done on the schedule contemplated by SB 528. For example, PJM recently announced that it was planning to suspend processing of new solar plants because of staff shortages. Many committee members will also be aware of local opposition to new solar farms in rural parts of the state. We need to follow a reasonable schedule to assure that the grid can handle the transition.

The unfortunate truth is that Maryland, acting alone, cannot materially impact global greenhouse gas levels, the degree of sea level rise or the average temperatures of our summers and winters. The State can do its part in a global effort but trying to overachieve could cause irreparable harm without any measurable benefit.

The new emission targets should be consistent with the recommendations of the Maryland Commission on Climate Change, the Biden Administration targets and the conclusions of the IPCC.

Change in the Cost-Effectiveness Test

One important protection in Maryland's existing Greenhouse Gas Reduction Act is a requirement that Maryland proposals must pass a cost effectiveness test that assures a net economic benefit and no net reduction in Maryland jobs. Those provisions do not prevent all economic pain. For example, unionized workers at coal burning power plants are not likely to be reassured by the creation of low-wage jobs installing solar roof panels. But the provisions do assure that the economy as a whole is spared the worst disruptions. Maryland successfully achieved the Act's 2020 targets without material impacts to the state's overall economy because the cost effectiveness test was followed.

SB 528 alters this test to say that the cost of new proposals must be compared to "no-action." If this means no action *by the State of Maryland,* then the language does not change the current practice. If this means to call for no action *by the World,* then it sets a standard which can never be met. If the test compares the cost of a measure to the damage that might result if China, India, and Russia (for example) take no action then the test could justify simply shutting down Maryland's economy entirely. The language should either be eliminated or clarified.

Residential Rate Impacts

The "high electrification" scenario mandated by SB 528 will also have an impact on residential gas and electric bills. "High electrification" refers to a scenario where buildings are converted to all-electric rather than using backup gas or gas from renewable sources (or a hybrid system where some buildings are electric and some use backup gas).

Energy + Environmental Economics modeled the impact on natural gas and electric rates of the high electrification scenario. Their conclusions in chart form are attached but they concluded that natural gas would experience "a rapid rate increase" to many multiples of the current rate by the 2040s. Electric rates (chart attached) would also increase significantly because of the need to accommodate larger peak loads.

Because of these concerns, the schedule should not be rushed, and the Act should incorporate measures to mitigate the economic impacts.

For these reasons, NAIOP respectfully requests an unfavorable report.

Sincerely,

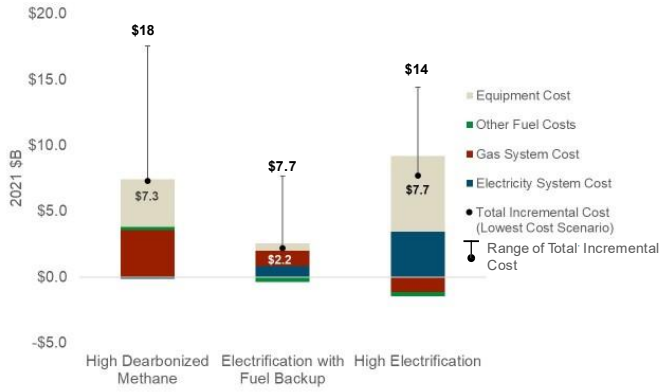
Michael C. Powell

Michael C. Powell

MCP/MCP

Electrification with Fuel Backup scenario is expected to be the relatively low-cost and low-risk among the three scenarios

Incremental Total Resource Costs for Buildings (2045) ($2021 Billions per year)



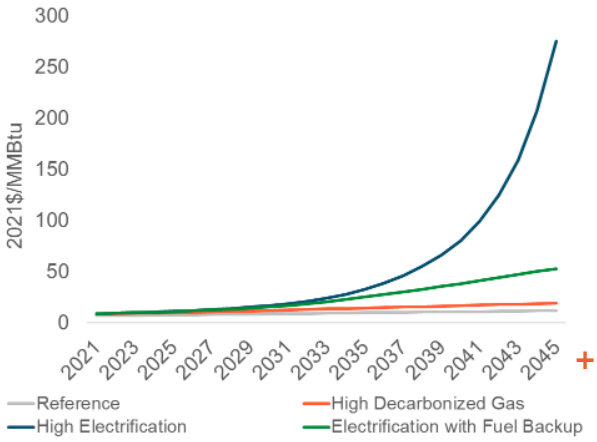
Total cost range reflects assumptions regarding fuel costs, equipment cost, and heat pump installation practices

Sources & assumptions: These charts show incremental resource costs of the scenarios compared to the reference scenario.

+ **Building sector costs show large variation across scenarios depending on:**
  - Gas fuel costs (optimistic/conservative supply curve)
  - Equipment costs (mainly building shell upgrade costs)
  - Installation practice for electric heating systems
+ **A hybrid scenario could potentially "hedge" for this uncertainty given its lower overall costs and narrow cost ranges**

Delivery costs of gas increase dramatically as more and more households electrify

Residential gas delivery costs (2021$/MMBtu)



+ **High Electrification scenario experiences a rapid increase in per unit delivery costs after 2025 due to the reduced gas throughput, regardless of the fact that total delivery cost is lower than in other scenarios**
  - High Electrification scenario assumes earning on rate base, depreciation, and O&M growth rates halved after 2025 leading to a 25% decline in total delivery costs by 2045.
  - As gas throughput and peak gas demand declines in the High Electrification scenario, reinvestment and maintenance for the gas system are expected to scale down.
+ **Reference, High Decarbonized Gas, and Electrification with Fuel Backup scenarios assume the historical earning on rate base growth rate is halved beginning 2035 assuming STRIDE is completed.**

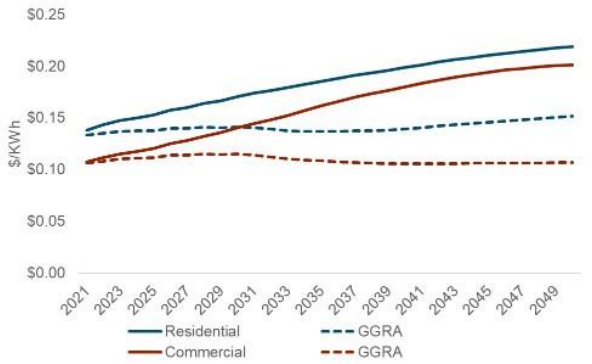
Sources & assumptions current Revenue Requirement (RR) is estimated using Maryland specific delivery prices per sector from EIA. Rate base increases are based on historical averages and flat capital expenditures (see Appendix). Scenarios assume a "Business as Usual" allocation of Revenue Requirement to customer groups. Cost allocations might shift as the ratio of consumption changes.

Source: Maryland Building Decarbonization Study, Final Report, September 16, 2021
E3 – Energy + Environmental Economics
Presentation to the Mitigation Working Group of the Maryland Commission on Climate Change

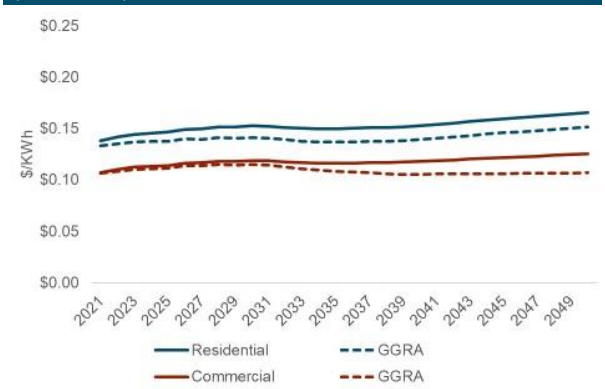
High Electrification scenario shows a more rapid electric rate increase compared to Electrification with Gas Back Up

+ The Electrification + Gas Back-up scenario is projected to have a lower rate increase because it has a smaller load factor and manages to avoid the expensive peak capacity investment.

Electricrates in the High ElectrificationScenario (2021$/kWh)



Electricrates in the Electrification+ Gas Back-up Scenario (2021$/kWh)



Energy+Environmental Economics 11

Source: Maryland Building Decarbonization Study, Final Report, September 16, 2021
E3 – Energy + Environmental Economics
Presentation to the Mitigation Working Group of the Maryland Commission on Climate Change

SB 528_Chesapeake Utilities_Unfav.pdf
Uploaded by: Mike Cassel
Position: UNF

SENATE EDUCATION, HEALTH & ENVIRONMENTAL AFFAIRS
SB 528 – Climate Solutions Now Act of 2022
Statement in Opposition – February 15, 2022

Chesapeake Utilities Corporation ("Chesapeake Utilities") respectfully **OPPOSES** certain provisions contained in SB 528. Among other things, SB 528 seeks to: (1) ban natural gas in all new buildings on or before January 1, 2023; and (2) impose strict emission limitations on existing commercial and multi-family residential buildings over 25,000 square feet[1] that decrease significantly over the next several years and impose severe fees on the owners of those buildings if they cannot convert off of natural gas service.

Chesapeake Utilities operates natural gas local distribution companies that serve approximately 31,000 customers on Maryland's Eastern Shore in Caroline, Cecil, Dorchester, Somerset, Wicomico and Worcester Counties. These public utilities are regulated by the Maryland Public Service Commission and have provided in the coldest months of the year safe, reliable, resilient and affordable service in the State for decades. As a company, Chesapeake Utilities serves as a positive and informed resource in the ongoing energy and climate change discussions. In fact, the natural gas industry in general (and Chesapeake Utilities in particular) has been a part of the largest reduction in greenhouse gas emissions in this country and will continue to drive the practical solutions needed to move forward. Chesapeake Utilities is committed to being part of the solution as Maryland considers legislation addressing greenhouse gas emissions.

Having said that, we oppose SB 528 because of the extraordinary uncertainty and costs it would impose on *each and every* Maryland utility ratepayer, which are significantly greater than any purported benefits the bill allegedly might provide. In addition, SB 528 is unnecessary because alternatives exist that can achieve greenhouse gas reductions in a practical and affordable manner; and under a realistic timeline that would not place the reliability of our electric grid at risk. Finally, SB 528 would eliminate thousands of good paying jobs (with family-sustaining wages) for energy workers.

SB 528 will significantly increase costs for Maryland residents. According to the Maryland Commission on Climate Change ("MCCC"), building direct use emissions account for 13% of economy-wide GHG emissions in Maryland.[2] To attempt to achieve this purported 13% reduction, the MCCC estimated that implementing a natural gas ban on new and existing buildings would result in a number of significant costs:

- Incremental total resource costs ramp up almost immediately and reach between $3 billion and $5 billion by 2045 ($2021).[3]
- *Annual* incremental electric grid investment costs ramp up over time and reach approximately $1.2 billion in 2045 ($2021).[4]

[1] We are aware of only two other states (Colorado and Washington) that have enacted similar legislation – but those laws apply only to buildings 50,000 square feet or larger
[2] *See* E3's *Maryland Building Decarbonization Study*, September 16, 2021 at 5
[3] MCCC *Building Energy Transition Plan*, November 2021 at 11 (assumes commercial building owners would pay $100/tCO2 for remaining emissions beginning in 2030, modeled as "alternative compliance" costs).
[4] *Id*. at 12. Maryland retail electricity rates are currently higher than the national average. *See* eia.gov.

- Electricity rates increase between 2 and 3 cents per kilowatt-hour by 2045.[5]
- Gas rates increase to the $40- 50/MMBtu range by 2045.[6]

A recent study by the Consumer Energy Alliance titled *The Hidden Costs of a Maryland Natural Gas Ban,* noted:

> *With more than 40% of Maryland homes relying on natural gas during the winter for heat, banning such a critical resource would be a devastating blow to families who would have to pay more than $26,000 to involuntarily reconfigure their home and purchase new appliances. A ban on natural gas would also lead to an increase in energy bills, placing an unnecessary burden on the nearly one in 10 Marylanders who live at or below the poverty level, those on fixed incomes, and businesses still recovering from the hardships of COVID-19.* [7]

SB 528 unnecessarily eliminates energy choice, compromises Maryland's electric grid and fails to recognize alternatives to a gas ban. Natural gas is a product that Maryland businesses and residents want and need. For example, obtaining natural gas service in Somerset County has been a priority of the Somerset County Commissioners for decades. We recently partnered with the State to bring a natural gas line to the University of Maryland Eastern Shore and the Eastern Correctional Institute in Somerset County. This project allowed UMES and ECI to transition off other less clean fuels (fuel oil and wood chips) that had served those institutions for decades – immediately reducing GHG emissions in this community. SB 528 would have prevented this Somerset County project. Today, Maryland residents who live in areas served by natural gas can choose to use gas or not. However, SB 528 would take that choice away and force Maryland residents to use only electricity in their new homes.

Also, banning and reducing the use of natural gas will significantly increase the amount of electricity required to be delivered to Maryland customers, which ironically is generated by natural gas. Delivering this increased amount for electricity into Maryland will require billions of dollars of annual investments in the Nation's and State's electric generation, transmission and distribution systems. Electric transmission and distribution system planning is a complicated and time-consuming process – as it should be. It can take years to obtain the regulatory and federal/state/local permit approvals necessary to construct electric transmission lines, substations and related facilities. SB 528 would significantly and artificially increase the demand for electricity in Maryland without any plan (or

[5] Id. at 14.
[6] *Id*. at 13. For comparison, EIA currently forecasts natural gas prices to remain near $4 per MMBtu in 2022 and decrease in 2023. *See* EIA.gov.
[7] *See* "Forced electrification could cost Maryland consumers more than $26,000, report finds" *The Star Democrat*, dated January 28, 2022

reasonable timeline) to ensure that Maryland's electric grid can reliably deliver this energy.

Finally, we note that natural gas companies have been and will continue to be valuable contributors to lower GHG emissions. Chesapeake Utilities currently partners with developers of renewable natural gas projects in Maryland that turn chicken litter and other organic material into pipeline quality natural gas. In addition, we are actively involved in the transportation of hydrogen for blending with natural gas for utilization in the generation of electricity in other states. Chesapeake strongly supports these (and other) innovative advancements in technology and the continued utilization of the natural gas industry's established and already built infrastructure to increase the likelihood of achieving net-zero targets while minimizing customer impacts.[8]

SB 528 is a job killer for Maryland workers. Mandating electrification and banning access to affordable and plentiful natural gas to all new buildings in the State is a job killer for both union and non-union Maryland workers. In addition, we believe that a gas utility worker should be part of the Just Transition Employment Retraining Working Group created by SB 528.

On behalf of Chesapeake Utilities, and our thousands of employees and their families who contribute every day in the communities where they live and work, we respectfully request an unfavorable vote on SB 528.

[8] https://www.aga.org/netzero.

SB528 UNF.pdf
Uploaded by: Morgan Mills
Position: UNF

ANNE ARUNDEL
CHAMBER OF COMMERCE
MOVING FORWARD

February 14, 2022

Senator Paul Pinsky
Chairman
Education, Health and Environmental Affairs Committee

RE: SB 528

Dear Senator Pinsky:

The Anne Arundel County Chamber has some concerns about the SB 528. The bill has a broad range of climate and energy efficiency provisions and would require the State to achieve 60% greenhouse gas emission reductions by 2030, net zero emissions by 2045, and annual statewide energy savings of 2.75% in 2027.

The bill also sets new standards for residential and commercial buildings in Maryland including 40% emissions reductions in all buildings by 2035. In addition, there is a deadline for June 30, 2023 to develop plans, adopt regulations, and implement programs that will reduce statewide greenhouse gas emissions in accordance with the bill.

The Chamber supports the concept of reducing greenhouse gases but would like to see a more realistic timetables particularly for the establishment of plans, regulations and programs. Getting these in place by June 2023 is too ambitious.

The proposed regulations for new emission standards for residential and commercial buildings are too much too fast. The bill seems to indicate new construction and existing building would be under the new standard, which would mean converting from gas to electric. It will be much easier for newly constructed buildings to incorporate material and systems that will be able to meet the new emission standards but it will be very costly and disruptive to retrofit all existing businesses, especially for smaller businesses and residential property owners

The Chamber believes that the deadline are too ambitious and will create a hardship for small businesses and small property owners. For those small businesses that own their building they will have to take on the cost of converting and for those small businesses that rent their facilities they would most certainly face a rent increase. The Chamber would encourage the Committee to review the bill in more detail and determine a way to reduce the financial cost to small business by either establishing a phase in period or providing financial assistance to small businesses and small property owners to help cover the cost of the conversion.

Respectfully Submitted,

Mark Kleinschmidt
President/CEO

SB528_ssaulters_apga_unfav.pdf
Uploaded by: Stuart Saulters
Position: UNF

AMERICAN PUBLIC GAS ASSOCIATION

February 15th, 2022

Re: SB 528

Dear Members of the Education, Health, and Environmental Affairs:

The American Public Gas Association (APGA) is pleased to provide comments on SB 528, "Climate Solutions Now Act of 2022." APGA is the trade association for approximately 1,000 communities across the U.S., including Easton Utilities in Maryland, that own and operate their retail natural gas distribution entities. Public gas systems are not-for-profit and locally accountable to the citizens they serve. They provide safe, reliable, affordable, and clean energy to their customers and support their communities by delivering fuel to be used for cooking, clothes drying, and space and water heating, as well as for various commercial and industrial applications.

Easton Utilities, along with every APGA member, are good stewards of the environment, evidenced by the way they maintain and operate their utilities, and they recognize that natural gas can provide energy affordably and reliably to Marylanders and all Americans, in addition to proven environmental benefits. Natural gas has been a big driver behind the declines in carbon emissions in Maryland and our country as a whole, and the existing pipeline infrastructure should continue to play an integral role in reducing greenhouse gas (GHG) emissions.[1]

APGA is especially concerned with the impacts on buildings from SB 528, such as requiring the adoption of new standards for the total phase out of the use of natural gas in water and space heating by 2030 in the construction of new buildings. Also, there is a mandate of 40% GHG reduction for all commercial buildings by 2035 and net zero emissions by 2040. As well, owners of commercial buildings are required to measure and report GHG emission to the Maryland Department of the Environment (MDE) beginning in 2025. To APGA, this proposal is a total phase-out of natural gas for residential and commercial buildings by 2040, which can have drastic cost implications for Maryland businesses and consumers, with questionable benefit to the environment.

The following elaborates on why natural gas and the infrastructure APGA members operate should be a part of Maryland's clean energy future. APGA hopes you will take them into consideration as you debate SB 528.

[1] United States Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019," https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

1. **Community-Owned Gas Utilities Ensure Energy Resiliency**

Energy supplied by public natural gas utilities, like Easton Utilities, play a critical role in ensuring energy resiliency in the communities they serve. A report by the Natural Gas Council reveals:

> The operational characteristics of the natural gas transportation network, in combination with the physical properties of natural gas, effectively minimize the likelihood and severity of service disruptions. In the rare event of a disruption, impacts are typically localized and brief. History demonstrates that disruption of firm pipeline transportation and/or storage services resulting from severe weather events are extremely rare.[2]

Also, the Gas Technology Institute found:

> Natural gas service disruptions are rare. On average, only 1 in 800 natural gas customers experience an unplanned outage in any given year. In comparison, electric system customers experience an average of one unplanned outage per year per customer.[3]

Reliable natural gas is needed for Maryland households and businesses.

As well, natural gas generators provide numerous families and essential services with a dependable source of power when electricity is unavailable. While a natural gas generator is already cleaner than one powered by diesel, innovation is being explored to lower emissions even further. A Micro-CHP system, typically used in homes or smaller commercial applications, generates electricity by converting natural gas to power with minimal emissions.

A trustworthy and diverse energy supply is critical to both national and domestic security, and we urge the state to be mindful to protect Maryland's energy resiliency through the continued utilization of natural gas and the pipeline infrastructure.

2. **Community-Owned Gas Utilities Deliver Affordablity**

Natural gas is a key component in maintaining affordability in the communities served by public gas systems, such as Easton Utilities. Currently, consumers pay relatively low prices for the direct use of natural gas for their cooking, home or water heating, and clothes drying needs. In August last year, the Department of Energy (DOE) published its "2021 Representative Average Unit Costs of Energy," acknowledging electricity is $39.83 per million Btu, and natural gas is

[2] Natural Gas Council, "Natural Gas: Reliable and Resilient." http://naturalgascouncil.org/wp-content/uploads/2019/04/Natural-Gas-Reliable-and-Resilient.pdf

[3] Gas Technology Institute, "Assessment of Natural Gas and Electric Distribution Service Reliability, https://www.gti.energy/wp-content/uploads/2018/11/Assessment-of-Natural-Gas-Electric-Distribution-Service-Reliability-TopicalReport-Jul2018.pdf.

$10.93 per million Btu.[4] A study also shows households with all-electric appliances pay almost $900 a year more than those that have the traditional mix of natural gas and electric homes.[5]

The affordability of natural gas is a key tool in addressing the social equity concerns posed by household energy burdens. A report by the American Council for an Energy-Efficient Economy (ACEEE) noted:

> "energy insecurity — the inability to meet basic household energy needs over time — is gaining attention as a major equity issue. Examining energy burden gives an idea of energy affordability and which groups could most benefit from energy justice and energy affordability policies and investments."[6]

ACEEE's report further highlighted that low-income, African American, Hispanic, and Native American households are the demographics most impacted with higher energy burdens. Therefore, Maryland should not discount natural gas as a key resource in decreasing energy burden. Ensuring Marylanders have access to the energy needed to heat their homes or water needs to be a focus of any state policy, especially in light of the necessity for equity and justice.

3. Community-Owned Gas Utilities Play an Important Role in a Low Carbon Future

RNG is pipeline-compatible, ultra-clean, and low-carbon. It is derived from the breakdown of organic wastes and can be processed to be used in existing natural gas infrastructure interchangeably with geologic natural gas in homes and businesses. Hydrogen has the capability to be blended with natural gas or possibly used exclusively; both have decreased emissions. In the future, blended hydrogen or hydrogen exclusively may be safely utilized in homes, businesses, and commercial applications. By preserving the natural gas infrastructure of today, Maryland's public natural gas utility can be a critical partner in delivering the low carbon fuels of tomorrow, ensuring sustainable energy for many years to come.

APGA would like to reiterate that Easton Utilities and all our members are committed to providing reliable and affordable energy, while protecting the environment with minimal disruption to consumer choice. As the state pursues its GHG reduction policies, APGA requests consideration of the unique operating circumstances of Maryland's public gas utility and encourages the continued utilization of their valuable infrastructure and experienced workforce in achieving the state's clean energy goals.

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[4] Department of Energy, "Energy Conservation Program for Consumer Products: Representative Average Unit Costs of Energy," https://www.federalregister.gov/documents/2021/08/25/2021-18325/energy-conservation-program-for-consumer-products-representative-average-unit-costs-of-energy.

[5] American Gas Association, Implications of Policy-Driven Residential Electrification, https://www.aga.org/research/reports/implications-of-policy-driven-residential-electrification/

[6] American Council for Energy-Efficient Economy, "How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burdens across the U.S.

If you would like to talk more, don't hesitate to reach out to my staff, Stuart Saulters (ssaulters@apga.org, 202-544-1334).

Respectfully submitted,

Dave Schryver
President & CEO
American Public Gas Association

SB528 T22Session.pdf
Uploaded by: Theresa Kuhns
Position: UNF

Senate Bill 528 – Climate Solutions Now Act of 2022

Position: Unfavorable

Maryland REALTORS® are committed to advocating for Maryland private property owners rights and acknowledge there is a need to balance climate mitigation with the growing challenge of affordable housing. We are concerned that SB 528 will impact housing costs of some multi-family housing as well as new construction.

Maryland is currently estimated to have a housing undersupply of over 80,000 units which includes both for sale and residential rental property. Moreover, according to the "Maryland Housing Needs Assessment and 10-Year Strategic Plan (Needs Assessment)," Maryland will be adding 178,000 new households between 2020 and 2030. The Needs Assessment also estimates that in 2030 more than half of all new households in Maryland will qualify as low-income. As the requirements for new additional units expand to meet the eventual net-zero requirements, the cost impacts on new residential housing are unclear. While costs today would certainly impact affordability, it is unclear how technology will change in the next 15 years. It is also unclear what sources of energy will provide the electric generation that will be needed for housing and transportation.

In addition to residential impacts, HB 528 will impact 17,000 Maryland commercial buildings which have struggled during the global pandemic. Commercial lending volume decreased approximately 60% in 2020, and it is important to note, lender losses in the commercial sector exceeded those of the 2008 financial crisis. National economists also predict short-term price declines for retail, office, and hotel properties of 4-7%. The unknown of the commercial recovery from Covid must be considered particularly as it is affected by retrofit requirements.

The upfront costs to construct a net-zero commercial building can be up to 15% more than conventional construction. A combination of increased construction costs and decreased lending availability will pose challenges to many projects including adaptive reuse of existing structures, which remains an important component of smart growth.

While Maryland can continue to be a leader in Climate Change legislation, advancing net-zero requirements for buildings by 2045 will make this job more costly and impact both residential and commercial property affordability. For these reasons, the REALTORS® recommend an unfavorable report.

For more information, contact

bill.castelli@mdrealtor.org, susan.mitchell@mdrealtor.org,

lisa.may@mdrealtor.org or theresa.kuhns@mdrealtor.org

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SB 528 Climate Action Now Act of 2022 - NAIOP Test

Uploaded by: Tom Ballentine

Position: UNF

NAIOP
MARYLAND CHAPTERS
THE ASSOCIATION FOR COMMERCIAL REAL ESTATE

February 9, 2022

The Honorable Paul Pinsky, Chair
Senate Education, Health and Environmental Affairs Committee
3 West, Miller Senate Office Building
Annapolis, MD 21401

Oppose: SB 528– Climate Action Now Act of 2022

Dear, Chair Pinsky and Committee Members:

The NAIOP Maryland Chapters represent 700 companies involved in development and ownership of commercial, mixed-use, and light industrial real estate, including some of the largest property owners in the state. NAIOP's membership is comprised of a mix of local firms and publicly traded real estate investment trusts that are invested in the future of Maryland but also have experience in national and international markets. On behalf of our member companies, I am writing in opposition to Senate Bill 528.

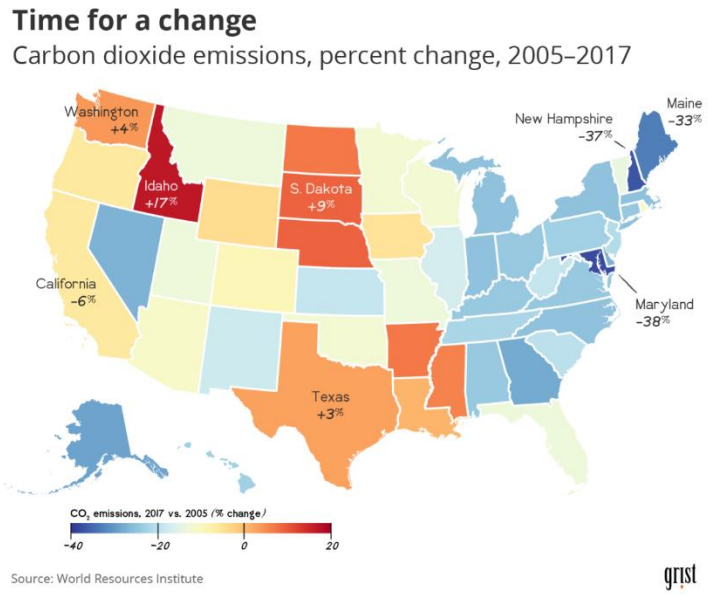
NAIOP's Commitment to the Greenhouse Gas Reduction Act

NAIOP supports adoption of reasonable strategies and responsible, technically sound regulations designed to reduce greenhouse gas emissions on schedules and using methods that minimize economic disruption and result in an orderly energy transition for building owners and occupants. We are concerned that SB 528 will result in an abrupt, unstructured, expensive and disruptive transition.

Success in climate mitigation fits the ambition and values of NAIOP's members. NAIOP supported adoption and reauthorization of the Greenhouse Gas Reduction Act. [GGRA] The GGRA ensures that Maryland's climate mitigation plans meet specific performance criteria that reduce greenhouse gas emissions but also generate economic benefits, maintain stable energy markets and present the public with least cost and practical compliance options.

Developing sets of practices that meet the intent of the GGRA principles can be challenging but it has produced strong results. In 2008 the state estimated that without action, emissions in Maryland would reach 128.3 million metric tons [MMT] by 2020. The GGRA 2030 Plan model results indicate emissions of ~67MMT in 2020.

A 2020 report from the World Resources Institute entitled, *"America's New Climate Economy"* ranked Maryland first out of 41 states that had both reduced emissions and grown their economies.

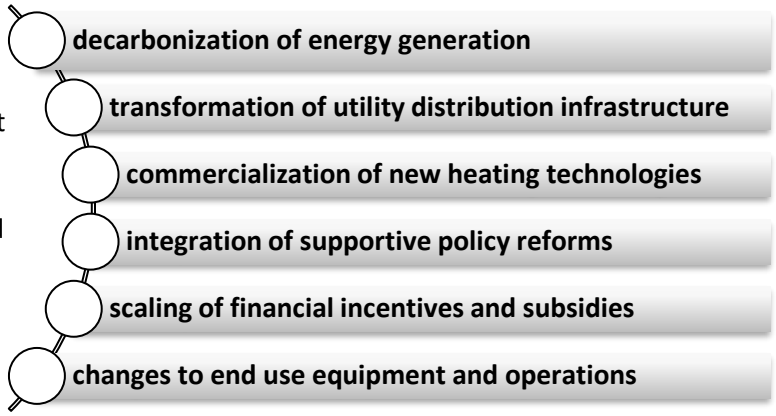


As climate mitigation gets harder it will be more important than ever that policymakers adhere to the performance characteristics called out by the GGRA.
If political demands are allowed to bypass or lower the performance standards set by the GGRA, then our view is that, in the short to medium term, the risk of abrupt and forceful policy mistakes will have a more significant impact on real estate assets in the state than the risk from physical climate change.

U.S. Mail: P.O. Box 16280, Baltimore, Maryland **Phone:** 410.977.2053 **Email:** tom.ballentine@naiop-md.org

Essential Policy Elements

Six Essential Elements of Building Decarbonization Policy



Building decarbonization depends on coordinated progress across six interrelated policy and market areas that start with renewable energy generation and end at building level changes to heat and hot water equipment.

The bill mandates changes to end use equipment and operations but does not provide answers to these other unresolved, interrelated policy issues.

It sets performance mandates and penalties but does not provide financial support to overcome the negative economics of electrifying large commercial buildings.
The deadlines in the bill do not provide time to address persistent issues related to the readiness of the utility grid, time for equipment to turnover at the end of its natural life, or for advancement in heat pump technologies. All of these things will increase the cost and difficulty of an energy transition.

The bill hastily decouples from the International Code Council [ICC] building and energy codes rather than allow ICC to complete development of its low carbon and zero carbon code pathways which would provide a technically sound and managed transition.

This state's ambitious goals to electrify building heating loads, automobiles and buildout renewable power generation and distribution all intersect at buildings. The order and pace of these transformational changes need to be sequenced and the costs and benefits equitably allocated between building owners and occupants, utilities and the electric vehicle industry.
A general lack of readiness in these important policy areas prevents building owners from believing that building electrification on the abrupt pathway set out by the bill will result in positive economic and environmental outcomes. Without more of a systems approach to thinking about climate mitigation and a structured, orderly framework the possibility of transition risks and policy mistakes become much more likely.

The Scale of the Bill – More than 1.5 billion square feet of space – 1/3 apartments, 2/3 commercial

Region	Buildings	Square Feet
Baltimore Metro	7,726	818,818,379
Lower Eastern Shore	510	47,701,744
Southern Maryland	467	36,512,649
Suburban Maryland	4,918	585,781,058
Upper Eastern Shore	486	47,820,051
Western Maryland	666	65,300,855
Total	**14,773**	**1,596,934,736**

Source: Costar

Economics

While there will be some cost-effective opportunities to electrify heat and hot water in smaller buildings, for many commercial buildings, electrification will not provide a return on investment during the lifetime of the equipment.

A research report by the American Council for an Energy Efficient Economy evaluated electrification of space heating in existing commercial buildings under several different scenarios.

The charts below show the simple payback period for buildings replacing gas fired furnaces and boilers with a commercial heat pumps system. Only 27% of commercial floor area will achieve a simple payback period of 10 years or less. The percentage that payback at the building level can be increased 60% with incentive payments The data are nation-wide, and the report notes much better heat pump economics in parts of the country that have mild winters and for building types with modest heating demand.

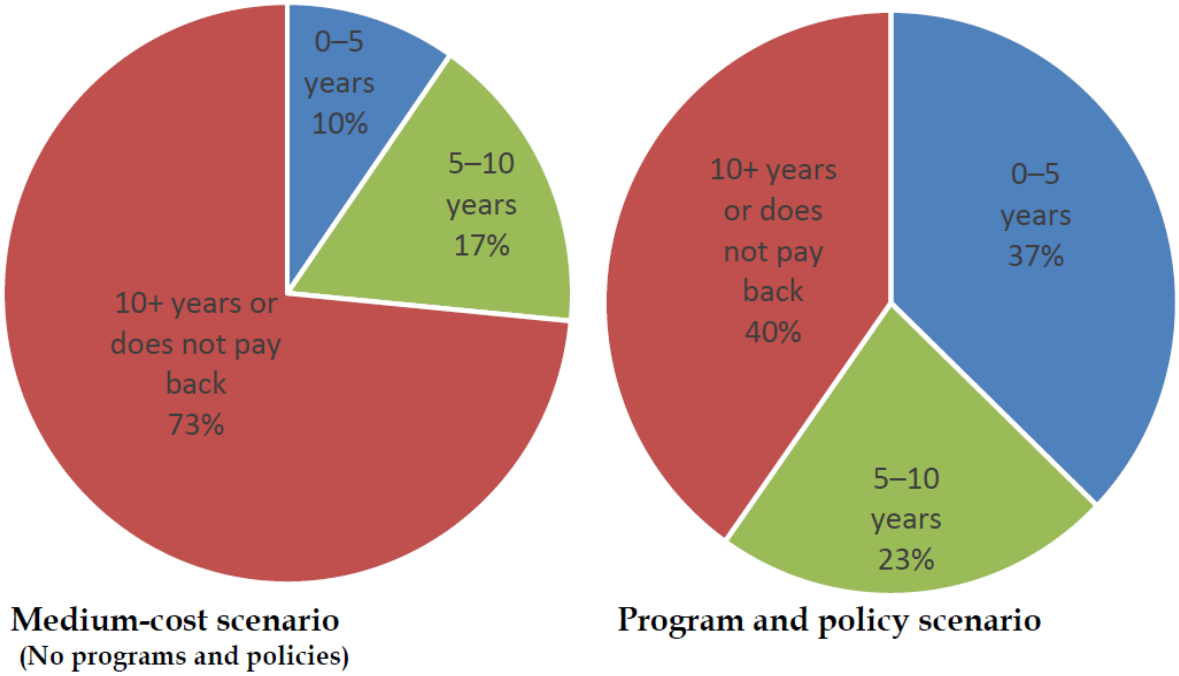


Figure ES-1. Distribution of the simple payback period by floor area for converting gas-fired rooftop systems, furnaces, space heaters, and small boilers to heat pumps when existing equipment needs to be replaced

For large commercial building types, heat pump and hot water heat pump technologies will not be cost competitive until price and performance improve. How quickly that happens will determine how quickly commercial buildings may be able to electrify.

The line graphs below were produced by MDE's climate consultant as part of analysis of the building energy transition plan. The consultant's reporting is based on assumptions that the cost of heat pump technologies will decrease 37% by 2050. Even with that optimistic level of improvement, the commercial heat pumps and heat pump water heaters [blue lines] are still more expensive to install in 2050 than other types of equipment.

Equipment costs trajectories were calculated up to 2050

- **Residential retrofit heat pump costs are projected to decrease by 28% by 2050**
- **Commercial retrofit heat pump costs are projected to decrease by 37% by 2050**

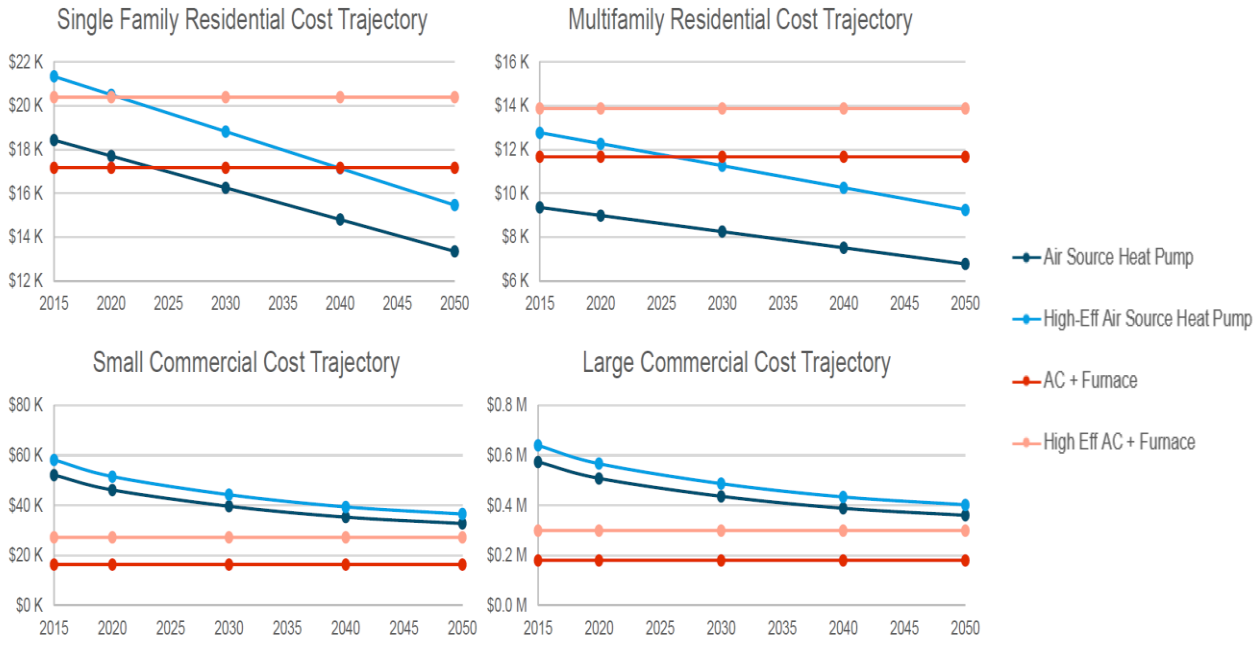
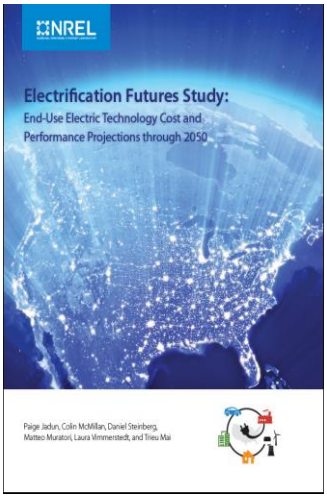


Figure 9. HVAC Equipment retrofit cost trajectories for each building sector

Energy+Environmental Economics | 55

National Renewable Energy Laboratory [NREL] – *Electrification Futures Study: End-Use Electric Technology Cost and Performance Projections through 2050* – Evaluates the levelized costs and forecast the rate of advancement in the price and performance of technologies important to building electrification.



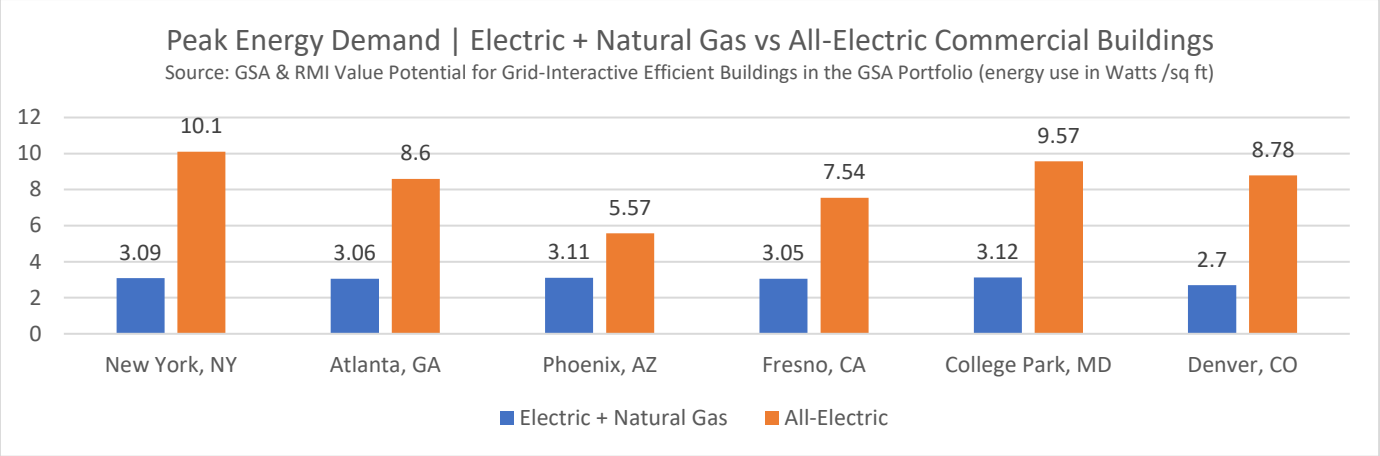
Key takeaways from the report related to the feasibility of electrifying commercial buildings:

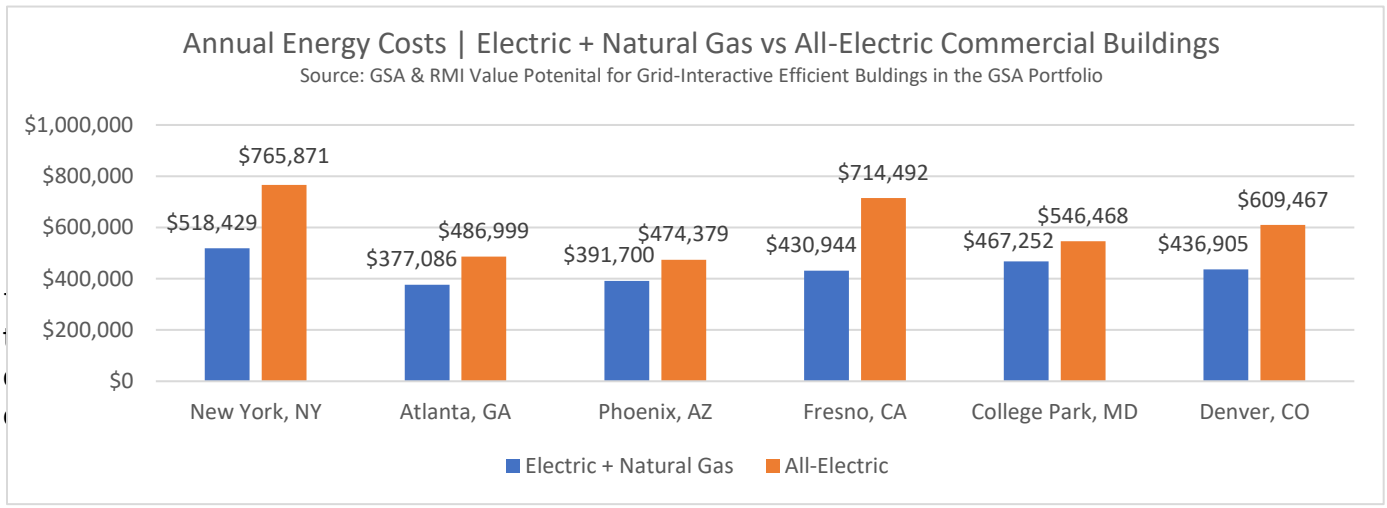
"In the commercial sector heat pump technologies for space heating applications in warm or moderate climates can become cost competitive by the end of 2040."

"In contrast commercial ccASHP (cold climate Air Source Heat Pumps) require substantial improvements to achieve cost parity with incumbent gas technologies, but with advancement…. could do so over the next two decades."

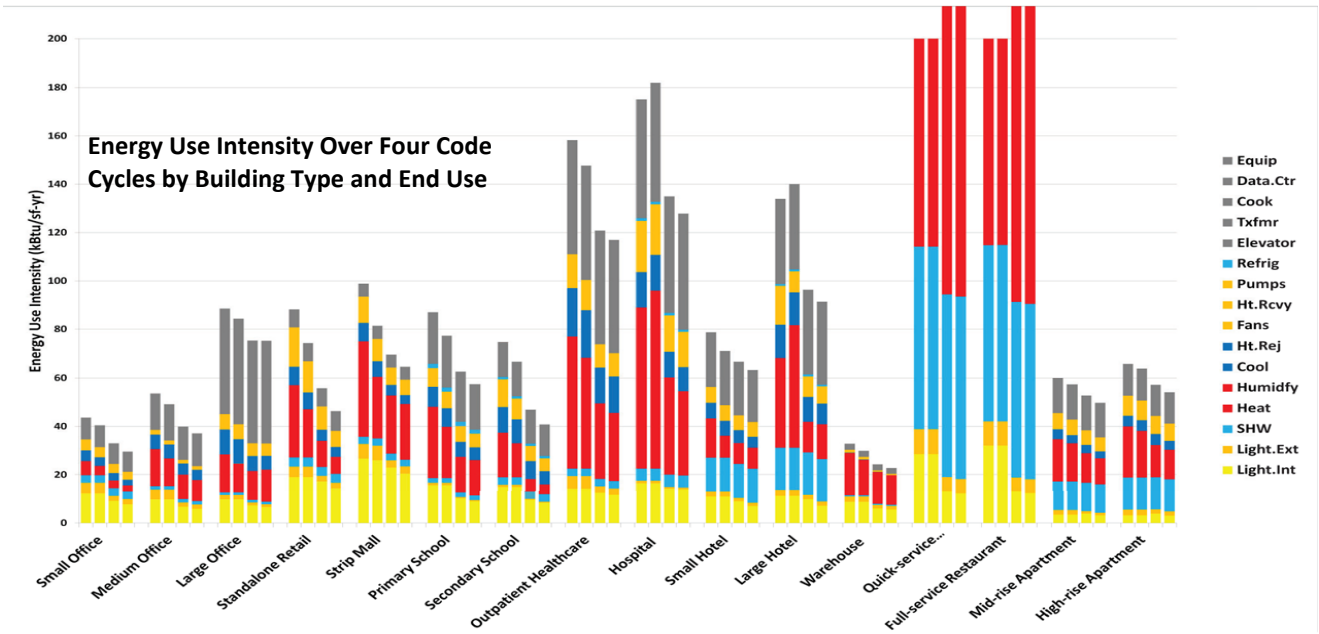
The report goes on to say that for a cost driven shift in adoption to take place, from gas fired water heaters to commercial heat pump water heaters, cost and performance would have to improve by 50%.

Peak Energy Loads and Total Energy Costs Increase with Electrification





The Level of Difficulty Will Vary



For decades, the commercial real estate industry in Maryland has been committed to energy efficiency, conservation, and high-performance construction. This experience leads NAIOP to consider deep reductions in carbon emissions from buildings to be the most challenging of the sectors.

Electrification and decarbonization will be technically and economically challenging for many building types. Feasibility is particularly challenging for large commercial buildings that have energy intensive occupants – restaurants, education, hotels, medical providers and 24/7 365 operations.

The World Green Building Council and other thought leaders say industry-wide decarbonization needs to happen by 2050. Decarbonizing the commercial building stock on a 2050 timeframe with goal of 2045 if it is feasible would be a challenge even under optimistic scenarios for technology advancement, renewable energy deploymentand and with favorable economic conditions. Requiring 40% of commercial building emissions to be abated by 2035 is unreasonable and it is not realistic to apply an industry-wide 2040 target.

Building Codes

NAIOP is has major concerns that decoupling from the building codes will force the use of unproven technologies and costly, untested code provisions.

Building codes and technical standards are carefully developed to balance building performance and cost through a process that has the capacity and expertise to ensure the standards and requirements are technically feasible, commercially available and cost effective for builders and occupants.

ICC is pursuing standards-based approaches reduced carbon and zero carbon construction that will provide for a technically sound and managed transition. Maryland should support that policy transition instead of adopting an arbitrary, calendar-based prohibition on fuel use. The state should wait for this work product to be finished rather than decoupling.

NAIOP believes success will be more likely through a technology and fuel neutral approach that resists component-based, piecemeal mandates and fuel bans. A holistic approach recognizes that buildings are complex, integrated systems that can provide multiple pathways to achieve performance objectives provided design teams have the freedom to make trade-offs and take advantage of synergistic opportunities. A fuel and technology neutral approach is taken by the national codes adopted by the state and local governments as the International Energy Conservation Code as well as EPA Energy Star, LEED, IGCC, Zero-Code and other voluntary high-performance building certification programs.

We caution against the tendency to conflate the ability of some buildings to effectively electrify with the ability of **all** buildings to electrify.

Heat pump technologies [both for heat and hot water] do not scale up well for deployment in large commercial buildings and will not be cost-effective for most commercial uses until technical performance improves, and costs decline.

Until then many large commercial buildings will use inefficient electric resistance equipment which will increase peak energy demand and electricity costs in ways not contemplated by MDE's scenario planning for building electrification.

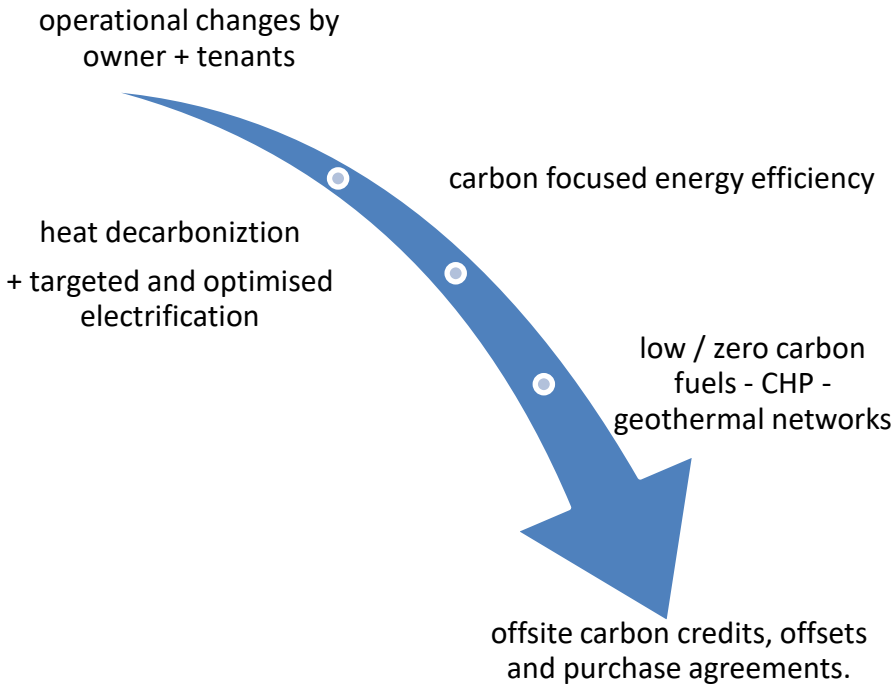
Whether electrification of large commercial buildings increases or decreases carbon emissions is dependent on the carbon intensity of utility generated electricity provided during peak heating periods. Peak heating demand occurs during early morning hours of the winter when renewable electricity generation and heat pump performance are both weak.

Under the definition secondary and back-up power generation are not permitted to be served by fossil fuels.

There are no provisions for grandfathering mature projects already designed for fossil fuel equipment construction in developments that have already installed gas infrastructure.

The bill provides various provisions that require state entities to comply only if they receive compensation for the incremental costs or allow requirements to be waived based on the suitability of equipment, site constraints, or the building use. Private buildings do not get this kind of consideration.

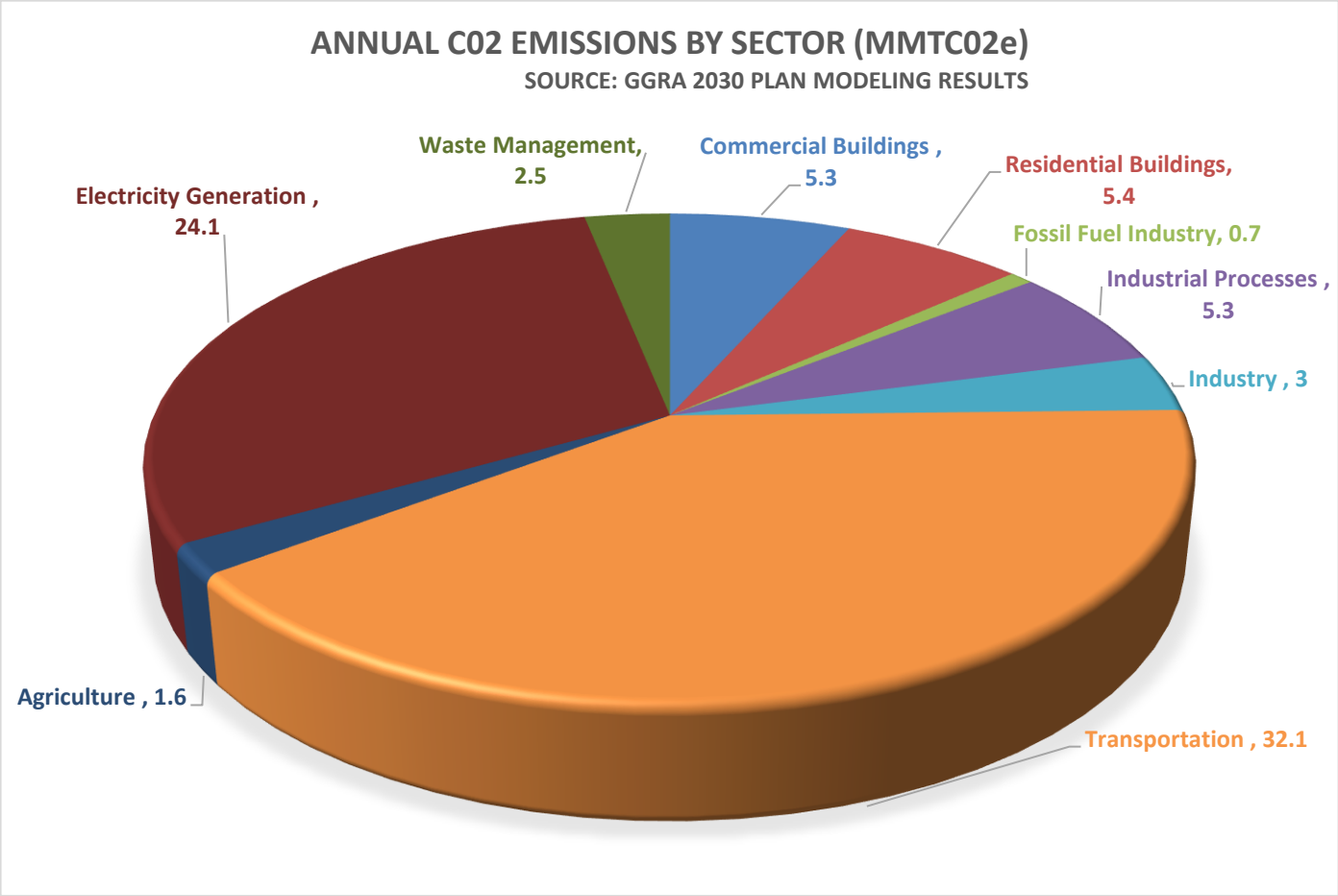
Building Energy Transition to Net Zero - Conceptual Framework



Perspective on the Amount of Building Emissions in Maryland

Emissions from commercial buildings are 5.3 million metric tons representing 7% of Maryland's economy-wide emissions total of 80 million metric tons. Emissions from natural gas use in commercial buildings are about 4MMT per year representing 5% of emissions.

From a cost to abate a ton of carbon, SB 528 presents one of the most expensive and challenging pathways. There are other lower cost approaches.



For these reasons NAIOP respectfully requests your unfavorable report on SB 528.

Sincerely.

Tom Ballentine, Vice President for Policy
NAIOP Maryland Chapters -*The Association for Commercial Real Estate*

cc: Senate Education, Health and Environmental Affairs Committee
Nick Manis – Manis, Canning Assoc.

SB528 testimony Federal Realty 220215.pdf
Uploaded by: Tom Ballentine
Position: UNF

RE: Senate Bill 528 - *Climate Solutions Now Act of 2022*
Senate Education, Health, and Environmental Affairs Committee
and Senate Budget and Taxation Committee
February 15, 2022
Oppose

Federal Realty Investment Trust opposes Senate Bill 528 – *Climate Solutions Now Act of 2022*. While we support the overall objective of the bill to address the environmental impact of the built environment, the ban on natural gas water heating is highly problematic in the larger commercial context, and the emissions standards will penalize existing highly efficient buildings.

Federal Realty is a recognized leader in the ownership, operation and redevelopment of high-quality retail-based properties located primarily in major coastal markets from Washington, D.C. to Boston as well as San Francisco and Los Angeles. Headquartered in North Bethesda, Maryland, Federal Realty's expertise includes creating urban, mixed-use neighborhoods like Pike & Rose in North Bethesda, Maryland, Santana Row in San Jose, California, and Bethesda Row in Bethesda, Maryland. Federal Realty's 104 properties include approximately 3,100 retail tenants in 25 million square feet, and approximately 3,400 residential units.

Federal Realty is a longtime supporter of reductions in greenhouse gas emissions (GHG). Federal Realty has a stated goal to reduce portfolio-wide Scope 1 & 2 GHG emissions by 30% by 2025. We have invested $1.2 billion in LEED certified buildings that have been placed in service with another $1 billion of buildings targeted to achieve LEED Gold certification in progress and we've invested $38 million in on-site photovoltaic systems. We have over 240 EV charging stations throughout our portfolio, and we prioritize purchasing green power where available through our supply agreement contracts. Nonetheless, Federal Realty opposes Senate Bill 528 as the technology does not currently exist to meet the standards imposed by the bill for larger commercial buildings and it will penalize existing buildings already designed to high levels of efficiency, a focus of ours over the past decade.

Under the International Energy Conservation Code (IECC) it is extremely difficult to comply with efficiency requirements with electric resistance heating, whether under the prescriptive or performance paths. Several alternatives exist for space heating at the commercial scale, but the sole alternative for domestic hot water heating – gas boilers – would be prohibited by this bill. Other technologies (such as heat pump boilers) do not yet exist at the scale necessary for larger commercial buildings, making compliance with the bill seemingly impossible at any cost.

The bill mandates significant increases in energy efficiency for existing buildings over a very short timeframe. Unlike recognized industry standards such as ASHRAE 90.1, the bill includes no shared baseline against which

building efficiency may be measured. For example, both an unrenovated, inefficient office building and a new LEED gold office building will have to achieve the same energy reduction targets, even though the new building is starting from a far better position. This has the effect of penalizing existing efficient buildings and burdening owners for having built to a higher efficiency in the first place. The financial penalties contemplated in the bill will be passed on to commercial and residential tenants, exacerbating housing affordability in Maryland and making the state a less attractive place to do business. More clarity is needed to ensure that proactive owners who have already built to a high standard are not penalized after the fact.

For these reasons, Federal Realty opposes Senate Bill 528.

Respectfully yours,

Geoff Sharpe
Vice President

2022-SB528_PHI Opp_V5-FINAL.pdf
Uploaded by: William "Bill" Sullivan
Position: UNF

February 15, 2022

112 West Street
Annapolis, MD 21401
410-269-7115

Oppose – Senate Bill 528
Climate Solutions Now Act of 2022

Potomac Electric Power Company (Pepco) and Delmarva Power & Light Company (Delmarva Power) oppose **Senate Bill 528 Climate Solutions Now Act of 2022.** Senate Bill 528 would establish a greenhouse gas emissions reduction target of 60% by 2030 and net-zero statewide greenhouse gas (GHG) emissions by 2045. The bill also seeks to develop energy efficiency and electrification requirements for both state- and privately-owned buildings. The bill would require that all newly constructed buildings be electric ready and would not permit heating via fossil fuels after 2022.

As part of the Exelon family of companies, Pepco and Delmarva Power joined Exelon's ongoing commitment to protect the environment and take actions to address climate change. In 2021, Exelon announced a new goal targeting a reduction in GHG emissions of at least 50% below 2015 levels by 2030, and net zero emissions by 2050. At Pepco and Delmarva Power, we are working to align our operations, grid investments, and customer product offerings and services with Maryland's climate change and clean energy goals. This means reducing our own GHG emissions from operations on a trajectory that meets or exceeds the state's reductions goals and working to inform and advocate for policies and processes that enable further decarbonization. Additionally, we strive to support our customers and the larger community by providing the tools, programs and resources needed to enable the transition to a more equitable and inclusive clean energy future and greater resilience in the face of a changing climate. In order to drive down GHG emissions to the level necessary to avoid the worst impacts of climate change, actions must be taken to decarbonize all sectors of the economy, while advancing efficiency, resilience, equity, inclusion and innovation.

Pepco and Delmarva are supportive of efforts to decarbonize Maryland. However, Senate Bill 528 advances Maryland's efforts to decarbonize, however, the details and timeline set forth in the bill will be difficult to implement and likely cost customers more money than would a longer-term, deliberate plan to decarbonize that accounts for equity and affordability. The timeframe in this

bill will require real estate developers to modify electric needs, which have been incorporated into existing planning to ensure safe and reliable service. The timeframe outlined in this bill is not sufficient to receive new interconnection requests from these customers, re-engineer interconnections, analyze modifications to planned investments, and implement new investments. Further, the impact on new investment needs may be considerable in fast growing areas of the system, and ongoing supply chain delays, as well as siting and permitting issues will likely slow the progress of emerging projects. Pepco and Delmarva Power, as the electric distribution companies, will need to plan for, invest in, and build these upgrades to ensure a reliable system for customers and to ensure the system can adapt to increased electrification. Additionally, without participation from the electric distribution companies in any task force planning processes for a transition to all electric distribution the aforementioned items will likely not be taken into account.

From an economic development perspective, Pepco and Delmarva Power are currently in discussions in all parts of our service territory with a variety of developers evaluating bringing business to Maryland. Discussions have included the construction of warehouses and data centers, as well as support for offshore wind manufacturing. States aggressively compete with one another to bring jobs and revenue that ultimately result in an improved quality of life for the communities they serve. Senate Bill 528 lays out a compressed time frame for Pepco and Delmarva Power to convert and prepare our system for all electric distribution and this will likely impact the decisions of these developers, who would undoubtably bring economic opportunities to Maryland, to consider other jurisdictions with less restrictive policies.

For the above reasons Pepco and Delmarva Power respectfully request an unfavorable vote on Senate Bill 528.

Contact:
Alexis Gallagher
State Affairs Manager
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Alexis.gallagher@exeloncorp.com

Katie Lanzarotto
Senior Legislative Specialist
202-428-1309
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IAC SB528 Letter of Information.pdf
Uploaded by: Alex Donahue
Position: INFO

BILL: SB0528

DATE: February 15, 2022

SUBJECT: Climate Solutions Now Act of 2022

COMMITTEE: Education, Health, and Environmental Affairs
Budget and Taxation

POSITION: Information Only

CONTACT: Alex Donahue
410-767-0102 (Baltimore)
alex.donahue@maryland.gov

EXPLANATION:
The Interagency Commission on School Construction (IAC) is providing information for consideration regarding SB0528 Climate Solutions Now Act of 2022, which specifies reduction in greenhouse gas emissions through establishment of statewide net-zero goals and alterations in building standards.

While the IAC supports the reduction of greenhouse gas emissions and reaching the net-zero goals set by the State, provisions in the bill may have significant implications for the local education agencies (LEA) in Maryland. The proposed changes could impact the number of construction projects executed by the LEAs and to the State due to potentially increased costs of construction.

In particular, the proposed legislation would require the Maryland Department of Labor (DLLR) to update the Maryland Building Performance Standards to require that new buildings meet all water and space heating demands without the use of fossil fuels, and ensure new buildings are electric ready unless local jurisdiction provides a variance. At a minimum, this provision would require fully electrifying new buildings. Such changes to the Maryland Building Performance Standards for new buildings would likely significantly increase an LEA's total project cost. Even with the variance, the LEA will still be required by the standards to be Electric-Ready for installation of solar energy, electric vehicle charging equipment, and building-grid interaction. This may impact the overall cost of construction to ensure that the facility is Electric-Ready.

A majority of school facilities in Maryland use electricity from the grid for their cooling and on-site fossil fuel systems for their water and space heating demands. The heating and hot water alternative to fossil fuels burned on site is electric systems powered from the grid. For heating, the cost to purchase electricity from the grid is higher than the costs of fossil fuels used on site, which will increase project costs. And, in some areas of the state, it is possible that the LEA will have no reasonably cost-effective and operationally efficient alternative to using fossil fuel systems. The bill allows variances to be granted by local jurisdictions with a cost-effectiveness test developed by the DLLR if the costs to abide by these standards outweigh the social cost of emissions.

Another provision with a significant impact on school construction is the proposed change to invalidate the existing guidelines developed by the Maryland Green Building Council (MdGBC) that require school buildings to achieve high-performance building status without requiring an independent certification

that the buildings have achieved the required standards. In its final report, the 21st Century School Facilities Commission ("Knott Commission") included a recommendation that the MdGBC develop guidelines for achieving the equivalent of LEED Silver without requiring independent certification in order to alleviate paperwork requirements and costs related to independent certification, after LEAs testified to the Commission that the certification process was costly and sometimes challenging. The Commission noted that LEED strategies have increasingly become standard practice within the construction industry and are largely represented in building codes.

As a result, the 21st Century School Facilities act modified the Maryland High Performance Green Building Program, to require that LEAs' newly constructed or renovated buildings meet or exceed LEED Silver or one of the two specified equivalent rating systems, but not require facilities to be certified as such. Imposing a certification requirement would lead to added costs to LEAs and, because the State participates in such costs, to the State. Such an increase in project cost is likely to result in LEAs implementing fewer projects and addressing fewer existing facilities needs.

Of significant importance, the benefit of LEED, net-zero-energy (NZE), and other energy saving programs and initiatives can be lost depending upon operational practices of many owners, which currently are resulting in actual facilities performance that is far below the level specified by the design energy-efficiency (EE) standards in place. As a result of this, further increasing the design EE standards level will return far less energy savings and reductions in greenhouse-gas (GHG) emissions than would an effort to work with owners to bring actual building EE into line with the standards that the facilities were designed to meet.

The IAC believe there is a need, which was also supported by the Workgroup on Educational Specifications, to foster real-time metering and reporting of energy use at the building level so that building performance and energy use—and, through them, the operational practices of facility owners and operators—can be evaluated and improved.

This legislation would additionally have the following impacts on LEAs:

- Require that at least one new school built by each Local Education Agency (LEA) between July 1, 2023 to June 30, 2033 meet NZE requirements, excluding those that receive a waiver in accordance with new IAC regulations.
- Establish a Net-Zero Grant Fund administered by the MEA to assist school systems with covering the cost difference between NZE requirements and high performance building.
- Require the MDE to develop standards that reduce net greenhouse gas (GHG) emissions from covered buildings owned by the state to zero by 2035 and of covered buildings not owned by the state to zero by 2040. Additionally, the MDE will be required to develop a plan to reduce statewide emissions to net-zero by 2045. The IAC cannot determine the impact that these standards or the plan will have on the LEAs until the MDE establishes them. However, it is expected that such standards would effectively require that LEAs replace or retrofit approximately 140 million gross square feet of existing buildings with a total current replacement value of about $60 billion to become NZE by 2040.

We respectfully request that you consider this information as you deliberate SB0528. For further information, please contact Alex Donahue at 410-767-0102 or alex.donahue@maryland.gov.

SB528 - Hopkins - LOI.pdf
Uploaded by: Annie Coble
Position: INFO

JOHNS HOPKINS
UNIVERSITY & MEDICINE
Government and Community Affairs

SB528
Letter of Information

TO: The Honorable Paul Pinsky, Chair
Senate Education, Health, and Environmental Affairs Committee

FROM: Annie Coble
Assistant Director, State Affairs, Johns Hopkins University and Medicine

DATE: February 15, 2022

Johns Hopkins would like to provide information relating to SB528 Climate Solutions Now Act of 2022. Johns Hopkins is very supportive of the State's efforts to reduce greenhouse gas emissions as a method for fighting climate change and is working diligently over the next several years to update its own institutional goals.

Johns Hopkins owns and operates many buildings (over 20 million square feet in total) throughout the State that would be required to comply with the new building emissions standards established in this bill. While Johns Hopkins supports the bill's intent and a majority of its strategies, we believe there are opportunities to meet the outlined objectives while providing responsible compliance pathways for different categories of building owners and operators. Specifically, the current legislation does not take into account the complexities of building owners who operate healthcare and research facilities that require significant reliability and redundancy safeguards, as well as those who heat and/or power their buildings through district energy systems.

On our campuses in Baltimore, Johns Hopkins has invested significantly in developing district energy systems that ensure critical reliability and redundancy for healthcare facilities, laboratories, offices and classrooms. While there is a variance for buildings whose electrification costs would exceed the social cost of carbon, the bill does not offer any additional variance pathways for building owners to fully study and propose solutions for the decarbonization of its large district energy systems. Significantly, this bill also does not account for complexities of hospitals and institutions that must be able to operate 24/7 with unique and sensitive patient care considerations. Even if a new hospital or medical clinic was fully electrified, it would be required to have access to a fossil fuel generator to meet federal standards for reliability and redundancy of power systems to ensure patient care is not impacted in the event of a power outage. As written, the bill does not provide for this important contingent need.

Moreover, for institutions with central plants and district energy systems, it is unclear how individual buildings will be required to report their greenhouse gas emissions as direct or indirect. Currently, using common approaches in EnergyStar Portfolio Manager, campuses can report a large number of buildings as a single entity encapsulating a central plant as direct

emissions or as a set of individual buildings whereby emissions from a central plant are considered indirect and would not be counted under the current legislation. Additionally, by excluding greenhouse gas emissions from electricity, the bill does not credit institutions for onsite or offsite renewable energy. It would be helpful if the bill looked at all Scope 1 and 2 emissions sources, or found a way incentivize renewable electricity and energy efficiency as well as decarbonizing heating.

Considering the issues stated above and the sensitive nature of many of the facilities that Johns Hopkins operates, we also seek assurances that utility providers, BGE and Pepco, are prepared to provide a level of service and capacity required by the rapid shift to 100% electrification.

Johns Hopkins is deeply committed to the important goal of reducing greenhouse gas emissions and fighting climate change and requests considerations of the issues raised herein to ensure this legislation works for building owners of all types, especially those with complex healthcare and research facilities and those connected through district energy systems. Due to the extenuating circumstances regarding the complexities of Johns Hopkins' buildings, it would be appropriate to allow more time for health care institutions and institutions with large scale district energy systems to work with the State to develop standards that meet all the needs of building owners under this legislation.

SB 528 Climate Solutions Now Act (Pinsky) B&T 2.15
Uploaded by: Barbara Wilkins
Position: INFO

LARRY HOGAN
Governor

BOYD K. RUTHERFORD
Lieutenant Governor

Maryland
DEPARTMENT OF BUDGET AND MANAGEMENT

DAVID R. BRINKLEY
Secretary

MARC L. NICOLE
Deputy Secretary

SENATE BILL 528 Climate Solutions Now Act of 2022 (Pinsky)

STATEMENT OF INFORMATION

DATE: February 15, 2022

COMMITTEE: Senate Education, Health & Environmental Affairs and Senate Budget & Taxation

SUMMARY OF BILL:. SB 528 requires the State to reduce greenhouse gas emissions (GHG) through the use of various measures to attain a reduction in GHG by 60% from 2006 levels by 2030 and achieve net-zero statewide GHG by 2045. In part, the bill establishes the intent of the General Assembly that 100% of the State passenger vehicles are zero-emission vehicles (ZEV) by 2030 and State light-duty vehicles by 2036. Subject to the availability of funding: (1) in FY 2023, at least 25% of passenger vehicles purchased for the State vehicle fleet are ZEV; in FY 2024-2025, at least 40%; in FY 2026, at least 75% and in FY 2027, 100%; and beginning in FY 2024, any passenger car purchased for the State vehicle fleet that is not ZEV is a hybrid vehicle; and (2) in FY 2028-2030, at least 25% of light-duty vehicles purchased are ZEV; in FY 2031-2032, at least 50%; and in FY 2033, 100%. DGS shall ensure the development of charging infrastructure to support the operation of ZEVs in the State vehicle fleet. An annual report is required of the Chief Procurement Officer on Dec 1 that details the purchases of ZEVs.

EXPLANATION: The State is integrating ZEVs into the fleet as replacements for internal combustion engine (ICE) vehicles where ZEV equivalents to ICE vehicles exist. Our approach to the inclusion of these vehicles is more robust than best practices of State Fleet Administrators throughout the country . As of this writing, we have 45 Zero-Emission vehicles in our fleet with an additional 88 on order.

The Department of Budget and Management (DBM) and Department of General Services (DGS) have worked collaboratively to develop a strategic plan to address the integration of ZEVs into the State fleet and are implementing the plan. The plan requires that charge station infrastructure may be installed at a site receiving an ZEV in advance of, or contemporaneous with, the arrival of the ZEV. Additionally, some funding for charge station infrastructure has been identified. This plan greatly increases the likelihood of a successful roll-out of ZEVs into the State's fleet. DBM has achieved purchase percentages of ZEVs of 8%, 29% and 46% over the last three fiscal years, respectively.

There are a number of factors that impede a more robust implementation of Zero-Emission vehicles:

- Availability of these vehicles is significantly ahead of the charge station infrastructure necessary to support their use. Level 2 charge station installations generally cost $10,000-$15,000 per station/unit;
- Limited availability of mid-size sedans, or larger, ZEVs. Currently, only foreign and luxury vehicle manufacturers offer these ZEVs. Due to their increased costs, these vehicles are generally not successful in the vehicle contract bid process and therefore do not appear on the statewide vehicle contract list; and,
- ZEVs have an upfront cost of ownership approximately $5,000-$8,000 higher than their combustion engine counterparts, thereby making it difficult for agencies to purchase in significant numbers.

While our goal is to reduce the environmental impact of the State's vehicle fleet, any requirement for full inclusion of ZEVs must also take into consideration fiscal sustainability and potential job performance disruption of State employees. For the foreseeable future, ZEVs will play an increasing role in reducing the environmental impact of our fleet as we work through the intricacies and challenges of a total fleet conversion.

This legislation would likely have an impact on the day-to-day operations of State government by causing DBM to purchase electric vehicles (EV) at a rate that would outpace the State's ability to provide charging infrastructure for them. Any mandate to purchase ZEVs at a rate in excess of 25% of all eligible vehicles prior to FY 2025 would hinder the goal of electrifying and reducing the carbon footprint of the State's fleet.

DBM has been able to meet or exceed a rate of 25% thus far; however, this was accomplished by converting the least difficult locations and most conducive business needs to ZEV. As we move forward, charging infrastructure will need to be installed at locations that are problematic logistically (e.g., leased properties) and will necessitate a slowing of ZEV purchases in order to ensure continuity of services provided by the State.

The allowance to purchase hybrid vehicles, when necessary, makes this Bill consistent with best practices nationwide and will allow the State's fleet to transition more seamlessly.

The bill's ZEV fleet reporting requirement for the Chief Procurement Officer is more appropriately within the purview of the State Vehicle Administrator at DBM. Please note that the State Vehicle Administrator is currently required to submit an annual report each December 15 that details State fleet vehicle purchases by agency and fuel type.

For additional information, contact Barbara Wilkins at
(410) 260-6371 or barbara.wilkins1@maryland.gov

SB 528 - Climate Solutions Now Act of 2022.pdf
Uploaded by: Donna Edwards
Position: INFO

MARYLAND STATE & D.C. AFL-CIO

AFFILIATED WITH NATIONAL AFL-CIO

7 School Street • Annapolis, Maryland 21401-2096

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President
Donna S. Edwards

Secretary-Treasurer
Gerald W. Jackson

SB 528 – Climate Solutions Now Act of 2022
Senate Education, Health, and Environmental Affairs Committee
February 15, 2022

INFORMATION

Donna S. Edwards
President
Maryland State and DC AFL-CIO

Chairman and members of the Committee, thank you for the opportunity to submit informational testimony on SB 528 – Climate Solutions Now Act of 2022. My name is Donna S. Edwards, and I am the President of the Maryland State and District of Columbia AFL-CIO. On behalf of the 340,000 union members, I offer the following comments.

The time for action on Climate Change is past due. Labor unions understand the fierce urgency of this battle for the future of our children and grandchildren. Workers and their families are on the front line of this struggle, making a living at traditional energy jobs, clean energy jobs, adaptation and mitigation construction jobs, and in myriad secondary and tertiary industries that directly affect energy and the environment.

As we transition to a low-carbon economy, it is important that we demand new energy jobs are family-sustaining careers and not simply new low-wage and minimal-benefit dead-end jobs. Traditional energy careers have buffeted and built the middle class and made our everyday lives possible and more comfortable for decades. Transitioning to a clean energy economy must empower our workers who have spent their careers helping power our state and country. Vitally important is providing a just transition to those currently working in traditional energy, as well as their families and their communities that are oftentimes severely negatively impacted by well-intended, but nonetheless, woefully thought-out and poorly implemented environmental policies that eviscerate these small towns.

I have attached to this testimony "Resolution #7: Resolution on Climate Change and Jobs", that was unanimously passed at our 32nd Biennial Convention in November of 2019. It is the position of the AFL-CIO, the Maryland State and DC AFL-CIO, and all of our affiliated unions, that we must do two things simultaneously: Fight Climate Change and protect and support workers. To that second point, we make it very clear in the Resolution how best to move forward on good job creation and a just transition to ensure that current traditional energy workers, as well as those in

industries that would be impacted by reducing our carbon production, are not left behind to fend for themselves. I would ask that you review Resolution 7 to have a full understanding of the position of labor unions and climate change.

SB 528 has a great deal of commendable provisions that will reduce our carbon footprint for the State. It also creates the Just Transition Employment and Retraining Working Group to start the process of tackling the very difficult challenge of re-structuring our economy for the future with an eye on workers in the present.

However, there is one area that is not specifically addressed throughout the bill: **Labor Standards for the jobs of the future**. I recognize that there is not an opportunity within SB 528 to define labor standards for new energy jobs due to the nature of the legislation. That does not negate the need to demand good standards on jobs created through each expansion of our clean energy sectors in Maryland.

Labor unions are heartened that there are no attempts to ban forms of energy within SB 528. The bill is much more focused on building up capacity in clean energy industries, instead of creating energy deficits through poorly thought-out bans. But, SB 528 does not address the best zero-carbon energy source that is both on-demand and necessary to meet future energy needs: Nuclear. Without nuclear on the table, it is unclear how we transition to clean-energy without significant brownouts and black-outs for Maryland's energy consumers.

Across Maryland and our country, energy professionals of our building trades are building the clean energy economy. We are rebuilding and retooling our energy infrastructure. We are working with the Biden-Harris administration as they invest in good union jobs that will power our economy and communities with clean, sustainable and secure energy. Through pre-apprenticeship requirements in PLAs, we are helping women, people of color and veterans access construction career pathways to middle-class jobs in the clean energy economy.

Labor is hopeful if sound policies are adopted that we can find the right solutions to our two-fold challenge of fighting climate change and, maintaining and creating family-sustaining middle-class careers in the process.

Resolution #7: Resolution on Climate Change and Jobs

WHEREAS, numerous studies suggest that there is major job creation potential from tackling the climate crisis, reducing greenhouse gas emissions, and transitioning to a low-carbon, sustainable economy; and

WHEREAS, the overall lack of high-road jobs in the green economy and the prevalence of non-union jobs in the limited existing green sectors, such as solar and residential retrofitting, have dampened enthusiasm for the long-promised "clean, green economy" among workers and labor organizations that are anxious to address the climate crisis and build a pro-worker, equitable green economy; and

WHEREAS, the fossil fuel industries have high rates of unionization; and

WHEREAS, strong job and training quality standards are needed in the clean and renewable energy sector, among them being prevailing wage, state-approved apprenticeship job training requirements, project labor agreements, and labor peace agreements; and

WHEREAS, a functioning jobs pipeline could ensure that local workers from our communities have a path to career employment by offering access to training programs such as direct-entry pre-apprenticeship programs and other skill-building opportunities; and

WHEREAS, these job and training quality standards should be central to all "climate jobs" proposals; and

WHEREAS, climate efforts should include funding and guaranteed protection for workers and communities who are displaced or negatively affected by the transition to a low-carbon economy; and

WHEREAS, the AFL-CIO has developed strong policy proposals for protecting workers who are impacted by climate protection policies. These proposals provide a just transition, including 70% wage replacement and 80% health benefit replacement for up to three years, as well as "bridge to retirement" funding for workers who are near retirement.

THEREFORE, BE IT RESOLVED, the Maryland State and District of Columbia AFL-CIO supports measures that ensure that energy infrastructure development creates good jobs and builds our industrial base by requiring project labor agreements, prevailing wage, apprenticeship job training requirements, Buy Union and Buy America provisions, labor peace, card check neutrality, robust training requirements for all projects, and includes all the labor requirements passed in the Clean Energy Jobs law.

THEREFORE, BE IT FURTHER RESOLVED, the Maryland State and District of Columbia AFL-CIO in facing the challenge of impacting energy policies embraces a balanced and just approach for workers, communities, manufacturers, businesses and consumers and will continue to work with community, business and environmental allies committed to recognizing the need for worker protections, rights, and sustainable wages and benefits, to maintain a wide range of energy sources, traditional and newer, to secure Maryland's and the District of Columbia's competitiveness.

THEREFORE, BE IT FINALLY RESOLVED, that the Maryland State and District of Columbia AFL-CIO will advocate for legislation, administrative rules, and the development of an initiative to enable a transition that is just for workers and communities directly affected by the transition to a clean energy economy by providing income, benefit, and retraining for comparable wage jobs, as well as a bridge to retirement, as part of the just transition and concurrently support the creation of these policies in an equitable fashion.

Submitted by: *Donna S. Edwards, President*
Maryland State and D.C AFL-CIO
Delegate, AFSCME 112
Gerald W. Jackson, Secretary-Treasurer
Maryland State and DC. AFL-CIO
Delegate, UA 486

Committee: Legislation

Convention Action: Unanimously passed

'22 SB 528 Climate Solutions Now Act DGS LOI EHEA

Uploaded by: Ellen Robertson

Position: INFO

Larry Hogan
Governor

Boyd K. Rutherford
Lt Governor

Maryland
DEPARTMENT OF GENERAL SERVICES
OFFICE OF THE SECRETARY

Ellington E. Churchill, Jr.
Secretary

Nelson E. Reichart
Deputy Secretary

BILL: **Senate Bill 528** - Climate Solutions Now Act of 2022

COMMITTEE: Education, Health, and Environmental Affairs; and Budget and Taxation

DATE: February 15, 2022

POSITION: Letter of Information

Upon review of Senate Bill 528 - Climate Solutions Now Act of 2022, the Department of General Services (DGS) provides these comments for your consideration.

The bill's impacts on DGS Design, Capital Construction, and Energy Projects:

- Environment Article § 2-1201 and Environment Article § 2-1204.1 to Environment Article § 2-1204.2; require the State to achieve Net-Zero Statewide Greenhouse Gas Emissions by 2045, and to reduce statewide greenhouse gas emissions by 60% from 2006 levels by 2030. There are multiple strategies that DCE can use when designing projects to help achieve this ambitious goal. These include, but are not limited to material sourcing, energy efficient designs and controls, landscape design, passive (solar) heating and cooling, and considerations for sustainable transit infrastructure.

- Environment Article § 2-1305 in paragraph (D) of this section has each agency take greenhouse gas emissions and global warming into consideration when developing long term plans and policy development. This will require DGS performance of additional analysis for each agency's long range master plans and individual facility projects.

- Public Safety Article § 12-503 is amended for the State to adopt a requirement by January 1, 2030, that new buildings meet all water and space heating demands without the use of fossil fuels. To comply new buildings would be designed and constructed with all electric systems. Additionally, any new buildings over 20,000 square feet of roof are required to be "solar ready". DGS anticipates the costs of new **capital design and construction projects to increase by an estimated 0.5%-0.8%** to meet this requirement; s**olar panel installation would require an additional $5.25 per square foot.**

- State Finance and Procurement Article § 4-810 paragraph (B) requires that DGS procure a **minimum of 75%** of its electricity from low-carbon renewable energy sources by FY30.This is **25% more than the 2030 Renewable Portfolio Standard (RPS) requirements**. Depending on the build-out of renewable energy systems within the grid interconnection and the cost of

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TTY users 1-800-735-2258

RPS compliance, this will likely **increase the cost of electricity between 10% to 50%**. DGS will also need three additional staff to support the increased purchase of renewable energy.

- State Finance & Procurement Article § 3-602.1 adds additional requirements for green building code compliance with the High Performance Green Building Program. To comply with the program's 50% requirement will mean additional costs and complexities for each DGS project. The role of the Maryland Green Building Council's is expanded under this article and Education § 5–312, to ensure buildings meet these requirements. The Council currently operates with two part time staff. To ensure compliance with the High Performance Green Building Program, a process whereby projects would be submitted to the GBC for review, analysis and approval or rejection. This process would require a team of staff members to ensure projects are properly managed, conducted, and compliance standards are met.

- Currently no electric equipment exists, other than resistance heating units, to replace large fossil-fueled boilers. Replacing a fossil-fueled boiler with an electric resistance boiler would require additional electrical infrastructure to meet the higher demand and would lead to significantly higher operating costs. **Upfront capital costs to upgrade the electrical service would be significant.** Alternatively, a fossil-fueled boiler could be replaced with a more efficient electrical system, but the HVAC heat distribution component may also need to be replaced. **However, the building would need to be vacant of occupants during this replacement, which would create another significant capital cost.** Alternatively, continuing the current telework policy and engaging in additional energy efficiency projects in existing buildings will reduce the energy use, and consequently, the GHG emissions of State operations, which will help to reach the goal of the Bill at no cost, or at a capital cost that will be recovered through reduced energy expenses**.**

The bill's impacts on <u>DGS Fleet and Fuel Management</u>:

- The Bill requires 100% of the State Fleet of light duty vehicles purchased be zero-emission by FY27. DGS currently has 77 light duty fleet vehicles, which would be replaced by ZEVs. DGS understands the **cost difference to be $10,604 between a traditional internal combustion vehicle and a fully electric vehicle** on a State contract. DGS's fleet is not scheduled nor budgeted for replacement. DGS will also need charging infrastructure in place to support an electric fleet, so there will be costs to procure and install charging stations.

- The estimated impact to expenditures includes the replacement of the DGS fleet includes sedans, SUVs, and minivans; but excludes police vehicles. **The cost to transition these non-police vehicles in the fleet to EVs would cost an estimated $500, 982 from FY23 through FY31.** This includes the cost differential to transition minus the savings associated with no fueling costs and less maintenance.

- DGS is leading a State-wide coordinated effort to identify Electric Infrastructure needs and ensure adequate infrastructure is in place to meet existing climate and transportation goals. **The cost to support the incoming ZEVs at State Agencies at a 2:1 ratio is estimated to be $2,000,000 per year, including charging equipment, construction, a 2-year equipment warranty, and 5 years' networked data and maintenance.** This will also **require DGS to hire six (6) new personnel to complete projects within this timeline**.

- DGS Inventory Standards and Support Services Division (ISSSD) manages the Statewide Fuel Program. Transitioning all State light-duty fleet vehicles to ZEV will have an impact on the Statewide Fuel Program and its revenues which are collected on the sales of fuel at State fueling stations. The program generates approximately $800,000 in revenue per year, from the sales of fuel. Revenues will be impacted by fewer vehicles requiring fuel. Depending on the roll out of replacement vehicles across the State, **DGS could lose $1.7 million in revenue by FY26**.

- The above referenced revenue is used for the agency division's operating expenses and will need to be absorbed elsewhere in the budget so that the fuel stations may remain fully functional until the entire fleet is electrified—something that may take many years. It is possible that there may be an opportunity to collect revenue through DGS owned Electric Vehicle charging stations in the future to offset some of the lost revenue.

- DGS notes that further than the 6-year scope of this fiscal note, there will be significant costs incurred for the decommissioning of the State's 120+ fueling sites. DGS will decommission **all non-MDOT** owned sites, which are expected to cost **$250,000 per site**.

The bill's impacts on <u>DGS's Capital Grants and Loans Program</u>:

- State Finance & Procurement Article § 3-602.1 changed from facilities with 100% state funding to facilities with 25% or more in State capital funds. Currently, the State's Capital Grants program is excluded. **This change would include capital grants and increase the cost of grantee's projects.** Many grantees are small, nonprofits entities; this requirement may be difficult for grantees to meet.

- In order to ensure that Capital Projects funded through the Capital Grants Program meet the criteria and standards established under the High-Performance Green Building Program the Capital Grants & Loans Office would need to add a minimum of **three (3) Compliance Officers at $60,000 each for an annual total of $120,000.**

The bill's impacts on DGS's Office of State Procurement:

- State Finance and Procurement Article § 14-417 requires reporting from the Chief Procurement Officer (CPO) at DGS on all agency purchases of vehicles. Currently, **DGS does not track the State's fleet, as these duties fall to the Department of Budget and Management (DBM)**. DBM is responsible for managing the State's fleet and establishing the annual fleet specifications and requirements that are approved by the BPW. **It would be appropriate for this reporting requirement to be the responsibility of DBM with support from the CPO** to provide purchase data from procurements for light-duty vehicles conducted during the previous fiscal year. The CPO, in coordination with DBM Fleet Management, would establish the "light duty vehicle" specifications for procurements and ensure all purchases were in accordance with the specifications and tracked within the State's eProcurement system, eMaryland Marketplace Advantage (eMMA), to obtain the annual purchase data. DGS would require personnel to gather and compile the purchasing data from eMMA for the annual report.

For additional information, contact Ellen Robertson at 410-260-2908.

SB 528_JStanek_Info.pdf
Uploaded by: Jason Stanek
Position: INFO

STATE OF MARYLAND

PUBLIC SERVICE COMMISSION

February 15, 2022

Chair Paul G. Pinsky
Education, Health, and Environmental Affairs Committee
Miller Senate Office Building, 2 West
Annapolis, MD 21401

RE: INFORMATION – SB 528 – Climate Solutions Now Act of 2022

Dear Chair Pinsky and Committee Members:

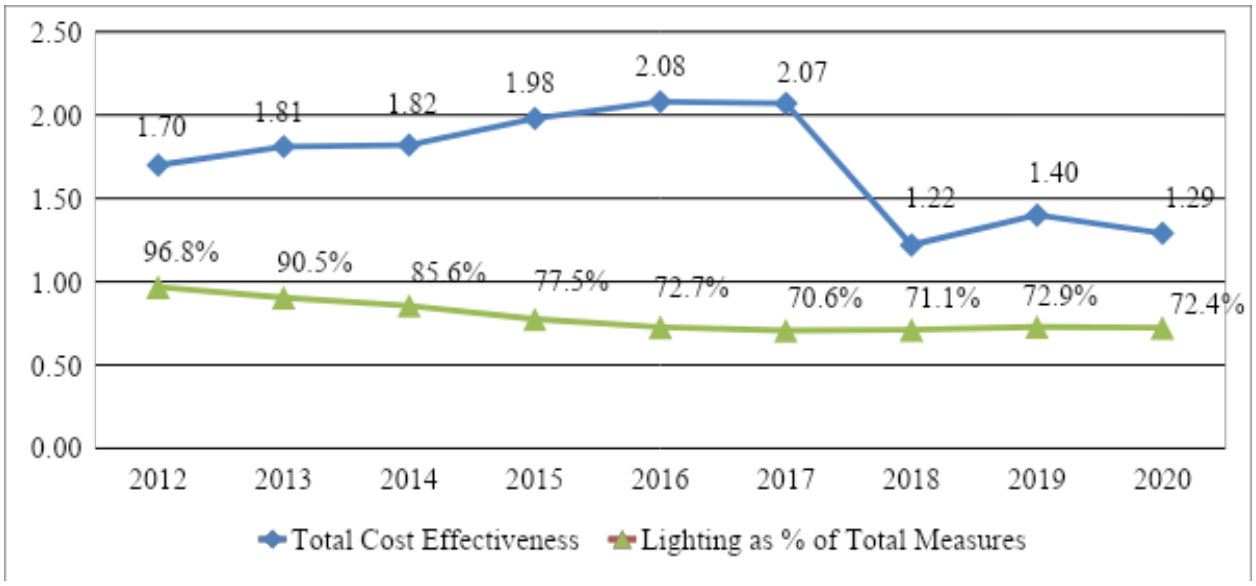
Senate Bill 528 envisions broad modifications statewide to address climate change, some of which impact the utility industry and ratepayers. The Maryland Public Service Commission would like to offer two observations regarding the energy efficiency goal changes and building code changes proposed.

First, recognizing that energy efficiency is one of the least expensive ways to meet electricity demands for consumers, the Maryland General Assembly passed the *EmPOWER Maryland Energy Efficiency Act* in 2008. This law established the EmPOWER Maryland Program with the stated goal of reducing electricity consumption and peak demand. In 2017, the General Assembly passed legislation to update Maryland's energy efficiency goals and extended the EmPOWER Maryland Program through 2023. SB 528 would add a new program cycle covering 2024-2026 and gradually increase the savings goal from 2% to 2.75%.

The Commission oversees implementation of the EmPOWER Program by the participating utilities and would like to highlight potential ratepayer impacts for the Committee's consideration. Through June 30, 2021, EmPOWER saved over 12.6 million MWh and 2,702 MW of peak demand, generating $1.29 in benefits to Marylanders for every $1.00 spent on these programs. The savings in forgone power production is equivalent to reducing 8.97 million metric tons of carbon dioxide emissions.

Historically, the majority of energy savings under EmPOWER came from the replacement of inefficient lighting (*e.g.*, incandescent lamps) with energy efficient alternatives (*e.g.*, LEDs). EmPOWER and other energy efficiency programs across the country have changed customer lighting preferences and resulted in changes to federal lighting standards. This has changed the lighting market, resulting in fewer inefficient lighting options available for

purchase. With much of the lighting fixtures now upgraded to efficient bulbs, other energy efficiency measures are being sought. As such, it is becoming more challenging to keep the costs of EmPOWER from increasing and the cost-effectiveness of the programs from decreasing. The graph below illustrates how the cost-effectiveness of EmPOWER has declined over time, with the decline in lighting as a percent of the total measures installed under the program.



The decline in EmPOWER lighting programs is expected to continue. If the Maryland General Assembly intends to preserve the cost-effectiveness of EmPOWER, the utilities will be required to invest in more expensive energy efficiency measures, which will impact the rates customers will pay on their utility bills. This year (2022), the average electricity customer in Maryland that uses 1,000 kWh per month can expect to pay between $6.19 and $8.42 per month for their EmPOWER charge. This amount will need to increase to accommodate changes necessary to meet the more aggressive goals in SB 528, while also ensuring that the programs remain cost-effective. The exact rate impact is unknown without further study.

Second, SB 528 proposes to revise the State's greenhouse gas goal from a 40 percent reduction in GHG emissions relative to 2006, by 2030, to a 60 percent reduction in GHG emissions relative to 2006 levels by 2032, and net-zero statewide GHG emissions by 2045. To achieve these goals, the electric and natural gas companies overseen by the Commission will likely be impacted significantly. Specifically, the proposed changes to the building codes prohibiting new buildings from using fossil fuels to meet water and space heating demands will impact how the utilities plan their systems, meet customer needs, and the rates customers pay on their utility bills. The exact rate impact is unknown without further study.

The Commission appreciates the opportunity to provide information on SB 528. Please contact Lisa Smith, Director of Legislative Affairs, at (410) 336-6288 if you have any questions.

Sincerely,

Jason M. Stanek
C-hairman

SB 528 climate testimony 2-15-22.pdf
Uploaded by: Jenna Massoni
Position: INFO

February 15, 2022

To: **Senate Education, Health & Environmental Affairs Committee**

From: **Bernie Marczyk, on behalf of Manufacturers' Alliance of Maryland**

RE: **Senate Bill 528- Climate Solutions Now Act of 2022**

Like many in the private sector, the manufacturing community is embracing and implementing a broad array of efforts to reduce greenhouse gas emissions and achieve Net Zero in an effective, sustainable manner. The issue, debate, and solutions surrounding climate change policies are critically important, and the legislation before the Committee today has several components with various impacts to communities and businesses.

The manufacturing industry is an important component to the health of Maryland's economy, and the Manufacturers' Alliance of Maryland ("MAM") has been a strong voice on tax and environmental policies that may be impactful to manufacturing in Maryland. While we are aligned with the overall goals of the legislation there are provisions of the legislation, if not altered or delayed, that could have a negative impact on the manufacturing industry's sustainability and growth in Maryland.

Specific comments are as follows:

1. The measures in this legislation put undue pressure on decision-making both from a policy perspective and from a manufacturer's growth perspective while trying to achieve goals that diverge from the increasingly accepted goals set by the United Nations International Panel on Climate Change, President Biden's administration, and Maryland's Commission on Climate Change. As one example of undue pressure, divergence from the widely embraced United Nations goal of Net Zero by 2050 will create avoidable distortions and disincentives for business in Maryland.

2. This legislation pushes Maryland to a single source, electricity, for all its energy needs. From a cost, supply, and reliability perspective, complete reliance on one form of power with no reasonable framework for alternatives for the manufacturing sector that requires significant electricity is concerning.

3. Before moving to a single source of energy for new buildings in the State, the security and reliability of the grid must be assured. The current electrical grid alone cannot reliably supply all of Maryland's energy needs and should be strengthened before truncating the growth and supply of natural gas and the availability of back-up supplies such as heating oil and propane.

Thank you for the opportunity to share this testimony with the Committee.

Bernie Marczyk
Cornerstone Government Affairs bmarczyk@cgagroup.com 202-744-8933

SB0528 - LOI - Climate Solutions Now Act of 2022 (

Uploaded by: Landon Fahrig

Position: INFO

Maryland Energy Administration

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor
Mary Beth Tung, Director

TO: Members, Senate Education, Health, and Environmental Affairs
FROM: Mary Beth Tung – Director, MEA
SUBJECT: SB 528 - Climate Solutions Now Act of 2022
DATE: February 15, 2021

MEA POSITION: Letter of Information

The Maryland Energy Administration (MEA) applauds the aspirational goals within the bill, and the strides that have been made over last year's bill. **However, several issues remain.**

Page 5, line 12 – Economic Development Article 10-854
This section creates a Climate Capital Fund to be administered by the Maryland Clean Energy Center (MCEC). MCEC is largely reliant on funding from the Maryland Energy Administration MEA via the Strategic Energy Investment Fund (SEIF). Should the mandatory $5 million appropriation also come from the SEIF, MEA's programs used for climate change efforts, greenhouse gas (GHG) reduction, and clean and renewable energy deployment would be equally reduced, limiting the effectiveness of the goals established in the bill. Additionally, the fund creates duplicative efforts under 10-855(d)(1) through (3) and (7), which are current MEA undertakings. Other paragraphs under this subsection may create duplicative efforts with other agencies.

Page 33, Line 5 - Public Safety Article 12-503(b)(3)
This section will require MEA to terminate any programs that incentivize natural gas as an on-site resiliency measure as well as a generation asset. This may hinder or eliminate the deployment of highly efficient combined heat and power (CHP) that is popular for use in critical infrastructure facilities, such as hospitals, as it helps them continue operations during catastrophic events. It may also hinder or eliminate the existing Resilient Maryland Program, that assists in the design phase of resilient campuses that can provide their own power during outages. These projects often use multiple energy sources, including, but not limited to natural gas. Lastly, the Maryland Energy Infrastructure Program would also be eliminated, which has expanded energy options and aided in the development of energy infrastructure for historically underserved communities in Maryland in Baltimore City and Somerset County.

Page 41, line 19 - State Finance and Procurement Article 14-418
This section requires a rapid escalation of the purchase of state fleet vehicles that are zero emission vehicles. As the SEIF is used to fund all MEA's climate change, GHG reduction, and energy programs, this rapid expansion will likely hinder these existing programs significantly if SEIF resources are further diverted for the purchase of fleet vehicles.

Pg. 43, ln. 29 - State Government Article 9-2010

MEA will be required to create a Net-Zero School Grant Program, adopt regulations, and create program guidelines and program materials. MEA has already supported three net-zero schools in Maryland (two in Baltimore City and one in Howard County). The agency supports the development of highly efficient schools through construction or retrofit, and MEA continues its work with the Interagency Commission on School Construction in assisting local education agencies that are developing energy plans and energy use reporting mechanisms. However, if the annual funding required by subsection (k) is sourced from the SEIF, the energy and GHG improvements of the school program will be offset by reductions in other programs, severely limiting any net emissions reductions.

MEA urges the committee to consider the forgoing when issuing its report.

NPMD Testimony_SB528_InfoOnly_Final.pdf
Uploaded by: Maurice Simpson
Position: INFO

February 15, 2022

Senate Bill 528 – Climate Solutions Now Act of 2022

INFORMATION ONLY

Nuclear Powers Maryland (NPMD), a coalition of like-minded organizations who recognize that Maryland has an important opportunity to become a clean energy leader by embracing carbon-free nuclear power, appreciates the opportunity to submit this informational testimony on SB 528 – Climate Solutions Now Act of 2022.

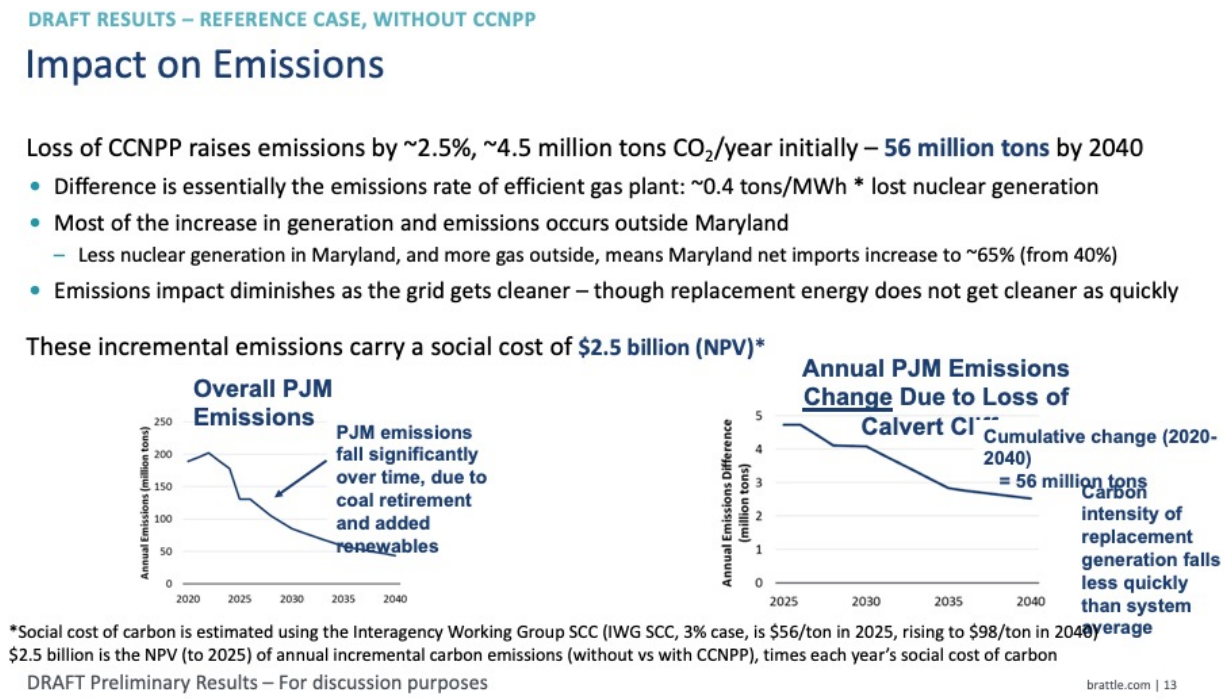
Nuclear Powers Maryland was founded in 2021 as an organization to advocate for state policies that recognize nuclear energy's role in accelerating clean energy progress and economic growth. Our members include the Baltimore-DC Metro Building Trades Council, Calvert County Chamber of Commerce, Calvert County Government, Center for Climate and Energy Solutions (C2ES), Centrus Energy, Constellation, Nuclear Energy Institute, LiUNA! Laborers Local 11, Orano USA and X-energy. As Maryland's largest source of carbon-free power, nuclear energy is the state's most important tool for quickly and cost-effectively transitioning to clean energy.

As the Committee begins its debate on the benefits of the Climate Solutions Now Act of 2022, we urge you to not take for granted clean, emissions-free nuclear energy. As part of a final bill, the General Assembly should formally recognize the essential role that nuclear energy plays in meeting SB 528's greenhouse gas reduction targets in a timely and cost-effective manner.

As currently drafted, SB 528 would reduce GHG emissions by 60 percent of 2006 levels by 2030, increasing our current goal by 50 percent. Unfortunately, the bill fails to acknowledge the vital role of nuclear in achieving these goals and simply assumes the uninterrupted operation of Calvert Cliffs Nuclear Power Plant through the end of its existing license in 2034. If this assumption is incorrect, however, Maryland would lose 15 million megawatt-hours of clean, carbon-free electricity annually - more than 80 percent of Maryland's carbon-free clean energy - and 40 percent of the state's energy overall.

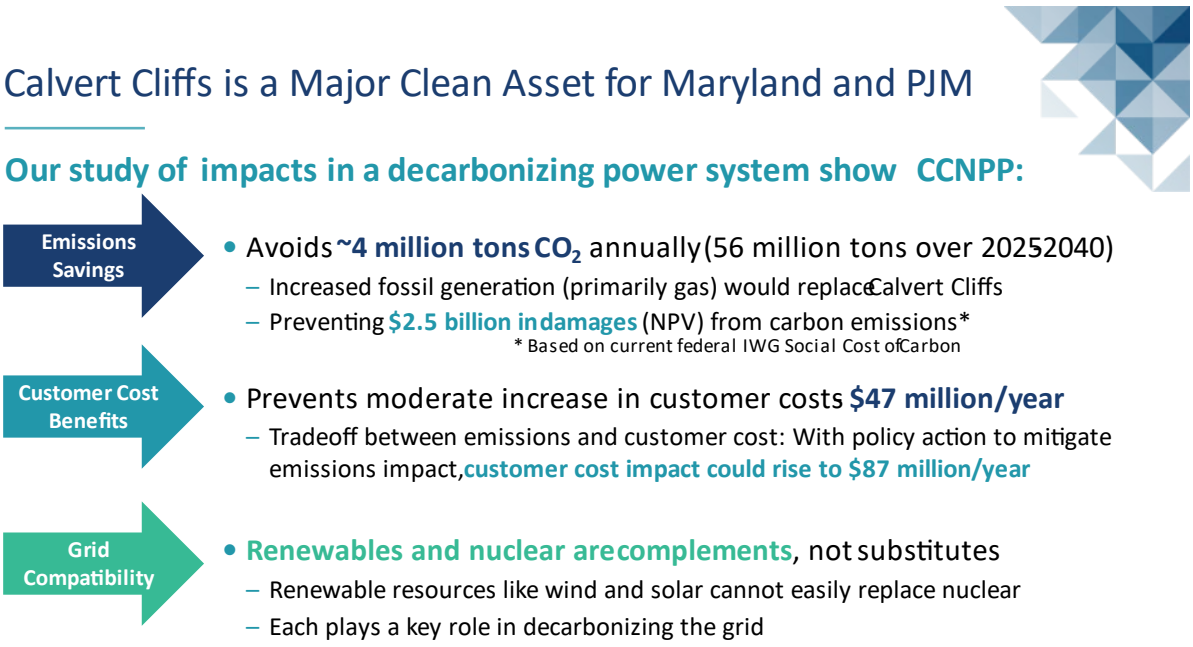
NPMD believes that any final legislation, must address how the absence of nuclear generation would impact the cost and timeline for Maryland to meet its emissions reduction goals. This can be accomplished by requiring the state to study, as part of the GHG reduction plan contemplated in SB 528, the impact to the cost and timeline of achieving the bill's GHG reduction goals if Calvert Cliffs were to prematurely retire.

Over the past several months, Nuclear Powers Maryland has been working with the Brattle Group to examine just how devastating the lack of nuclear energy would be to Maryland's climate goals and economy. Just last month, NPMD hosted a workshop where the Brattle Group presented preliminary findings from a study it is expecting to release in the near future. As demonstrated below, the Brattle Group findings show that without nuclear energy, Maryland would see an annual emissions increase of about 4 million tons of carbon - the equivalent of driving 3 million vehicles for a full year – with the cost of this increased pollution to Marylanders exceeding $2 billion.



The clean, reliable and affordable energy production from Maryland's nuclear resource cannot be replaced overnight. It would take an additional 4,600 MW of solar and wind energy combined to replace Maryland's clean energy output from nuclear—that's the same as one-third of all the renewable energy in operation across the 13 states and Washington, D.C., that make up the PJM power market.

When examining Marylanders energy costs, the Brattle Group found that if nuclear energy were to be removed from the state's energy portfolio, energy costs would increase at least $47 million annually. Moreover, if Maryland were to increase its already aggressive RPS program even further in an attempt to replace the state's lost nuclear output with new wind and solar it would cost Marylander's close to $900 million over a ten year period.



There is nothing comprehensive about a climate plan that fails to acknowledge the largest source of carbon-free energy in the state. The Education, Health, and Environmental Affairs Committee must formally recognize the essential role of nuclear energy through a provision that requires the state to study, as part of a GHG reduction plan, the impact to achieving GHG reduction goals if Maryland were to prematurely lose its most abundant and reliable source of carbon free energy.

Signed,

American Nuclear Society
Baltimore-DC Metro Building Trades Council
Calvert County Chamber of Commerce
Calvert County Government
Center for Climate and Energy Solutions (C2ES)
Centrus Energy
Constellation
EXCEL Services Corporation
Nuclear Energy Institute
Nuclear Matters
LiUNA
The Nuclear Alternative Project
Orano USA
Sensible Energy Matters to America (SEMA)
Studsvik Scandpower
WSC
X-energy

NUCLEAR POWERS MARYLAND

Maryland Needs Nuclear Power to Meet Climate Goals

Let's not take nuclear power for granted. The Maryland General Assembly must formally recognize the essential role that nuclear energy, and the continued operation of Maryland's own Calvert Cliffs Nuclear Power Plant, must play in meeting Maryland's greenhouse gas reduction goals in a timely and cost-effective way.

Two bills under consideration in the General Assembly (SB528 and HB708) seek to reduce statewide greenhouse gas (GHG) emissions and address climate change. The Senate's Climate Solutions Act of 2022 would reduce GHG emissions by 60% of 2006 levels by 2030—increasing our current goal by 50%. Meanwhile, the House's Comprehensive Climate Solutions Act would meet that same goal by 2032.

These bills take for granted that Calvert Cliffs will make it to the end of its current license (expires in 2034), which would enable Maryland to meet 60% GHG emission reductions from 2006 levels by 2030. **But what if this assumption is incorrect?**

Nuclear Powers Maryland seeks to *meaningfully* include nuclear energy in Maryland's climate plan.

Nuclear power enables companies, cities and communities to reduce emissions; supports grid reliability and carbon-free renewables growth; and prevents harmful pollutants from being emitted into the air we breathe. Our legislative proposal would ensure this progress continues in two important ways:

PROPOSAL 1

Recognize Calvert Cliffs as a Clean Power Workhorse

Our legislative proposal seeks formal recognition by the Maryland General Assembly that nuclear, and the continued operation of Calvert Cliffs in particular, is essential to Maryland meeting its greenhouse gas reduction goals in a timely and cost-effective way. Maryland is behind other environmentally active states in formally recognizing nuclear's environmental contributions and now is the time. Without Calvert Cliffs, Maryland will lose 15 million megawatt-hours of clean electricity annually—the equivalent of adding an estimated 2.3 million cars' worth of carbon dioxide to the air we breathe.

PROPOSAL 2

Consider Nuclear Energy as Part of a GHG Reduction Plan

Our proposal also includes a nuclear energy scenario in the development of a greenhouse gas reduction plan. To the extent that climate legislation requires the development of an action plan, our Coalition proposes that the plan consider a potential future scenario where Calvert Cliffs is under economic distress and the impact an early retirement could have on Maryland's environment, economy, health and greenhouse gas reduction requirements.

VISIT WWW.NUCLEARPOWERSMD.COM AND FOLLOW @NUCLEARPOWERSMD ON LINKEDIN, TWITTER, FACEBOOK AND YOUTUBE FOR UPDATES AND MORE INFORMATION ABOUT HOW NUCLEAR WILL HELP MARYLAND REACH ITS CLEAN ENERGY GOALS.

Nuclear energy is necessary to reduce emissions.

- Provides 15 million megawatt-hours of clean energy each year – enough to power 1.3 million homes.
- Avoids 2.25 million cars' worth of carbon dioxide in electricity generation.
- Supports renewables expansion by providing grid stability with its round-the-clock power.

Nuclear energy is a vital part of the Maryland economy.

- Maryland's nuclear industry supports nearly 1,200 in-state full time jobs.
- Maryland's nuclear industry provides nearly $15M in state tax revenues annually.
- Calvert Cliffs employs a highly skilled workforce, providing 691 family-sustaining jobs to Marylanders. Annual aggregate employee salaries and benefits is nearly $180M.
- Nuclear power saves consumers an average of 6% on their electricity bills and contributes approximately $60 billion to the country's GDP annually.

Nuclear Powers Maryland Coalition members look forward to working with the Maryland General Assembly as we all work to meet the ambitious goal of achieving net-zero statewide GHG emissions by 2045 and support good-paying jobs in our community and Maryland's overall economy.

National Democratic Leaders Have Already Embraced Nuclear's Vital Role in Climate Policy

> **"Carbon-free nuclear power is an absolutely critical part of our decarbonization equation." "The first priority ... is to preserve the existing nuclear fleet, which generates 20% of US electricity and represents more than half of its carbon-free power"**
>
> **- SECRETARY JENNIFER GRANHOLM, U.S. DEPARTMENT OF ENERGY, JUNE 2021**

> **"In addition to being carbon-free, nuclear is the only source of generation that can reliably produce mass amounts of clean energy 24/7, 365 days a year. As crucial as solar and wind are, only nuclear can consistently power homes and businesses regardless of weather conditions."**
>
> **- LONNIE R. STEPHENSON, INTERNATIONAL PRESIDENT OF THE INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS**

NUCLEAR POWERS MARYLAND

MEMBERS OF THE COALITION

American Nuclear Society
Baltimore-DC Metro Building Trades Council
Calvert County Chamber of Commerce
Calvert County Government
Center for Climate and Energy Solutions (C2ES)
Centrus Energy
EXCEL Services Corporation
Exelon Generation
Nuclear Energy Institute
Nuclear Matters
LiUNA
The Nuclear Alternative Project
Orano USA
Sensible Energy Matters to America (SEMA)
Studsvik Scandpower
WSC
X-energy

VISIT WWW.NUCLEARPOWERSMD.COM AND FOLLOW @NUCLEARPOWERSMD ON LINKEDIN, TWITTER, FACEBOOK AND YOUTUBE FOR UPDATES AND MORE INFORMATION ABOUT HOW NUCLEAR WILL HELP MARYLAND REACH ITS CLEAN ENERGY GOALS.

JOIN US!

SB0528 - ENV - Climate Solutions Now Act of 2022 -

Uploaded by: Patricia Westervelt

Position: INFO

MARYLAND DEPARTMENT OF TRANSPORTATION

Larry Hogan
Governor
Boyd K. Rutherford
Lt. Governor
James F. Ports, Jr.
Secretary

February 15, 2022

The Honorable Paul G. Pinsky
Chairman, Senate Education, Health, and Environmental Affairs Committee
2 West Miller Senate Office Building
Annapolis, MD 21401

Re: Letter of Information – Senate Bill 528 – Climate Solutions Now Act of 2022

Dear Chairman Pinksy and Committee Members:

The Maryland Department of Transportation (MDOT) takes no position on Senate Bill 528, but offers the following information for the Committee's consideration.

Senate Bill 528 presents far-reaching impacts on numerous aspects of Maryland's transportation network, including the State fleet, MDOT facilities, and additional data collection and reporting requirements.

As proposed, Senate Bill 528 would exclude MDOT from reporting on emissions reductions that might result from "highway widening or additional road construction". These 'highway widening or additional road construction' projects could be able to achieve the protection of "public health, economic well-being, and natural treasures of the State by reducing harmful air pollutants such as greenhouse gas emissions by using practical solutions that are already at the State's disposal" (Environment Article, §2-1201). This would limit both the MDOT and the State's ability to pursue innovation within existing rights of way, which is often a practical solution.

Senate Bill 528 also requires passenger cars and other light–duty vehicles purchased for the State vehicle fleet to be zero-emission vehicles (ZEVs), subject to the availability of funding, with all passenger vehicles in the State fleet to be ZEVs by 2030, and all light-duty vehicles in the State fleet to be ZEV by 2036. The bill further lays out a schedule under which a certain percentage of purchases in the intermediate years are required to be ZEVs. Approximately 1,500 vehicles in MDOT's fleet may be affected by the purchase requirements and schedule outlined in Senate Bill 528. The MDOT owns approximately 390 Passenger cars (sedans) that would be candidates to be replaced with a ZEV model starting in FY 2023. Approximately 680 SUVs and Light-Duty Pickups, and over 400 Vans and Mini-vans could also be classified as Light Duty Vehicles as defined in this bill and could be candidates to be replaced with ZEV models starting in FY 2028.

Currently, light-duty ZEVs are more expensive than conventional fuel vehicles. The conversion of the passenger and light-duty fleet to electric will depend on the availability of zero-emission vehicles on State contracts, which is dependent on the supply of these vehicles by manufacturers and other aspects of the State's procurement process. It is suggested that, due to availability and fleet turnover, 2040 is a more realistic timeline to reach an entirely ZEV fleet.

Additionally, Senate Bill 528 proposes a new Just Transition Employment and Retraining Working Group, within the Maryland Commission on Climate Change (MCCC). Among the identified duties of this working group, is to advise on issues and opportunities for workforce development and training related to the transportation sector. MDOT is not currently listed as a member of the Working Group. Given the focus on emissions reduction related to transportation and electric vehicle charging infrastructure deployment, there will be a significant need for ensuring that there is appropriate representation from the MDOT on this new working group.

Senate Bill 528 adds new building standards, including water and space heating demand without the use of fossil fuels, includes electric-ready standards, and establishes that the Maryland Department of Labor shall adopt these standards and develop a "cost-effectiveness test". There is a cost associated with electric-ready standards for new buildings that could impact capital projects already underway at MDOT, including MTA bus facilities and MDTA's office building at the Bay Bridge. The total potential impact if required to redesign is indeterminable at this time, given that it may require a new evaluation for solar, electric-vehicle charging, and building grid interaction to meet the additional goal of 75% of the electricity provided at these facilities be derived from low-carbon energy sources by 2030. Both requirements outlined in Senate Bill 528 will increase prices for contract development and are dependent on external agencies and partners to ensure grid readiness and broad availability of low-carbon renewable energy sources statewide, identified as solar, wind, geothermal, ocean, and hydroelectric.

The Maryland Department of Transportation respectfully requests the Committee carefully consider this information when deliberating Senate Bill 528.

Respectfully submitted,

Heather Murphy
Director of Planning and Capital Programming
Maryland Department of Transportation
410-865-1275

Pilar Helm
Director of Government Affairs
Maryland Department of Transportation
410-865-1090

SB528 - UMMS - Letter of Information 2-15-22.pdf
Uploaded by: Shane Sarver
Position: INFO

UNIVERSITY of MARYLAND
MEDICAL SYSTEM

250 W. Pratt Street
24th Floor
Baltimore, Maryland 21201-6829
www.umms.org

CORPORATE OFFICE

Senate Bill 528

Climate Solutions Now Act of 2022

Position: **Letter of Information**

Education, Health, and Environmental Affairs

February 15, 2022

The University of Maryland Medical System (UMMS) would like to provide information regarding SB528, the *Climate Solutions Now Act of 2022*. UMMS appreciates and supports the goals of this legislation to reduce greenhouse gas emissions. UMMS recognizes the risk that climate change poses to the communities we serve and as such, has established organizational sustainability goals and is in the process of finalizing a corporate Sustainability Declaration which includes carbon reduction.

UMMS owns and operates many buildings throughout the State that would be subject to the emission requirements established in this bill. UMMS constructs new buildings to LEED (Leadership in Energy and Environmental Design) Silver or higher standards as LEED certified buildings improve efficiency, lower carbon emissions and create healthier places for people. However, under the legislation, even buildings that are already high performing, like the LEED Gold Shock Trauma Center, would be expected to achieve an additional 20% and later 40% emissions reductions as the bill is currently written.

The Centers for Medicare & Medicaid Services (CMS) conditions of participation require health care organizations to provide an alternate source of power, should normal power not be available, for a minimum of 96 continuous hours.

Interconnected buildings pose another challenge. As an example, the grid does not independently support the newly constructed Shock Trauma building on the UMMC campus; instead, it is supported by a loop that interconnects the other buildings on campus. This design type offers redundancy, reliability and optimizes energy efficiency. If all new buildings on the UMMC campus were required to be all-electric, the loop is eliminated and would sacrifice redundancy, reduce reliability and increase construction costs.

It is also unclear that utility providers, would be able to provide the level of service and redundancy that UMMS requires through 100% electrification.

As stated above, UMMS appreciates and supports the State's efforts to reduce greenhouse gas emissions as a method for fighting climate change. However, due to the complexity of our buildings and regulatory factors at play, more time is needed for health care institutions and

institutions with large scale interconnected systems to work with the State to develop standards that meet all the needs.

SB 528 - Electric Cooperatives Joint Letter of Con

Uploaded by: Stephanie Kane

Position: INFO

February 15, 2022

The Honorable Paul Pinsky
Education, Health, and Environmental Affairs Committee

Re: *Letter of Information – Senate Bill 528 – Climate Solutions Now Act of 2022*

Chairman Pinsky and Members of the Committee:

On behalf of Old Dominion Electric Cooperative (ODEC) and Choptank Electric Cooperative (Choptank), we appreciate the General Assembly's work to produce thoughtful legislation to reduce greenhouse gas emissions in Maryland but have concerns with Senate Bill 528 as written. This bill may impede our ability to deliver reliable and affordable electricity to Maryland residents by requiring overly burdensome and premature developments to a renewable energy infrastructure in an effort to achieve net-zero greenhouse gas emissions by 2045.

ODEC is a not-for-profit wholesale generation and transmission electric cooperative owned exclusively by 11 not-for-profit retail distribution electric cooperatives that serve 1.5 million people in Virginia, Delaware, and Maryland, including Choptank's 55,000 members. We are dedicated to providing safe, affordable, reliable, and sustainable power. ODEC has reduced CO_2 emissions by 44% since 2005 and has a strategic goal of net-zero greenhouse gas emissions by 2050. We are leading the way for electric cooperatives by enhancing our renewable energy portfolio (*See* the Criterion Wind Project in Garrett County), evaluating and investing in solar power and battery storage technology, and undertaking a variety of efforts to work toward a clean energy future.

As ODEC continues efforts to address climate change solutions, we are dependent on our state-of-the-art, natural gas combined-cycle power plant in Cecil County, Wildcat Point Generation Facility, to provide nearly 1,000 MW of clean, reliable power to the citizens of Maryland, Virginia, and Delaware. The facility, which was permitted by Maryland in 2014, came online in 2018 to meet growing energy needs and to reduce power imports into Maryland. Therefore, we raise concerns that Senate Bill 528 and its 2045 goal, as written, may negatively impact our ability to meet our dual goals of providing reliable and affordable power while also reducing emissions. We would encourage the Committee to consider a later date for the state's net-zero target.

ODEC and Choptank remain dedicated to reducing CO_2 emissions, and we look forward to working with the Committee, the bill's sponsors, and other stakeholders to help Maryland achieve its clean energy and CO_2 reduction goals. For more information, please contact Stephanie Kane, ODEC's Director of Government Relations, at skane@odec.com.

Respectfully Submitted,

Kirk Johnson
Senior VP, Member Engagement
Old Dominion Electric Cooperative

Matt Teffeau
Government Affairs Manager
Choptank Electric Cooperative

SB0528 LOI w amendments.pdf
Uploaded by: Tyler Abbott
Position: INFO

February 15, 2022

The Honorable Paul G. Pinsky, Chair
Education, Health, and Environmental Affairs Committee
Miller Senate Office Building, Suite 2W
Annapolis, Maryland 21401

Re: Senate Bill 528- Climate Solutions Now Act of 2022

Dear Chair Pinsky and Members of the Committee:

The Maryland Department of the Environment (MDE or the Department) has reviewed SB 528 - *Climate Solutions Now Act of 2022,* and would like to offer a letter of information with recommended amendments. MDE's amendments are attached below.

The Department strongly supports the bill's overall objective to reduce greenhouse gas (GHG) emissions. Climate change is an urgent threat, and all levels of government and nongovernment organizations must take increasingly aggressive and balanced actions to reduce GHG emissions and increase community resiliency. Maryland is a national leader in this area, realizing substantial reductions in emissions since the first Greenhouse Gas Reduction Act (GGRA) was passed in 2009, and with the Hogan administration taking bold new actions to achieve significant progress. While the Department welcomes efforts to accelerate action to combat climate change, we would like to provide information and offer some amendments to the bill as currently drafted.

Overall
The Department has some concerns with the language changes to existing law. The language in the 2009 GGRA and 2016 GGRA was the result of a very comprehensive process that resulted in strong environmental protection and economic growth. Those bills were agreed upon by a wide array of interested parties, including environmental advocacy groups, labor and industry representatives, state agencies, and public citizens. Some of the language changes to the existing GGRA that are proposed by this new bill would threaten the consensus underlying current state law.

The bill declares new goals to achieve a 60% reduction in statewide GHG emissions by 2030, and net zero GHG emissions by 2045. While the Department generally finds more ambitious goals to be laudable, the committee should be aware that developing a plan for Maryland to achieve those goals through state programs while still meeting the law's requirements for economic impacts will be difficult and may even be unachievable based on what Maryland can do at the state level to reduce GHGs. Such rapid reductions will require improvements in federal programs to advance new technologies and make major infrastructure investments. The Department believes that such federal action is necessary and long overdue, but when developing a state plan, the Department cannot assume federal action at that scale.

In 2020, the bipartisan, independent Maryland Commission on Climate Change (MCCC), which includes the Senate and House sponsors of this legislation in its membership, unanimously approved a recommendation for Maryland to adopt similar ambitious GHG reduction goals. The MCCC recommended a different reduction goal for 2030 – at least a 50% reduction rather than a 60% reduction – and the same net-zero goal for 2045.[1] These paths are not mutually exclusive, as the goal in the GGRA sets a floor on reductions, not a ceiling. The Department has always aimed to develop plans to

[1] mde.maryland.gov/programs/Air/ClimateChange/MCCC/Documents/MCCCAnnualReport2020.pdf

exceed the required reductions by as much as possible, given available technology, constraints on state authority, and the requirements in the law relating to economic benefit and other impacts.

On February 19, 2021, the Department submitted its comprehensive, extremely detailed 2030 GGRA Plan to the Governor and General Assembly. The well-documented and modeled plan advanced a portfolio of measures that would, if fully implemented, reduce Maryland's 2030 GHG emissions to approximately 50% below 2006 levels, in alignment with the MCCC's recommended 2030 goal.

GHG Reduction Plan Timeline and Methodology

The bill would require the Department to issue a proposed plan to achieve the new 2030 GHG reduction goals by June 30, 2023, followed by a final plan by December 31, 2023. In addition to the 2030 GHG reduction goals, the final plan would also require the Department to set the state on a path toward net-zero by 2045 by the end of 2023. The Department would like to provide feedback on that timeline. The bill's requirement for a final 2030 GHG plan following a draft by only six months does not allow for public comment and review of the numerous new mitigation programs that such a plan would need to propose, followed by material changes to program design and analysis. The Department and other state agencies would struggle to meet that deadline, as development of new mitigation programs requires significant time for research, careful analysis, and consultation among agencies and with outside experts, including other states and the MCCC. The revised 2030 GHG reduction goal would require that MDE repeat the comprehensive emissions and economic impact analysis included in the current GGRA plan process.

The bill also places some narrower methodological requirements on the GHG plan that give MDE some concern. The provision requiring that MDE shall use the global warming potential for methane over a 20–year time horizon is problematic for at least two reasons. First, it would violate national and international GHG measurement protocols, including under the Paris Climate Agreement,[2] by estimating methane's impact on climate change over 20 years instead of 100 years. MDE's practice is to use the 100-year value to be consistent with national and international standards, and then supplement that with estimates using the 20-year value to understand the important near-term impacts of methane emissions. Second, developing a GGRA plan that meets a 60% reduction in GHG emissions by 2030 using a 20-year value for methane is a significant shift in the development of Maryland's plan to reduce GHGs because the 20-year value nearly triples the reported near-term climate impact of methane. The methane emissions reduction measures that would need to be identified to meet the 2030 target would be unprecedented and problematic to meet within the bounds of the current law.

Additionally, the bill requires the plan to include "specific estimates of the reductions expected from each greenhouse gas reduction measure included in the plan." Older versions of the GGRA plan did include such "measure-by-measure" analysis, but methodologies and models have advanced since then, and best practice among modelers and planners is now to analyze the effects of multiple measures simultaneously within an economy-wide modeling framework. This is due to many programs interacting with one another in fundamental ways, so they do not have independently attributable impacts. By analyzing such measures together, analysts can capture those interactive effects and correctly estimate what all measures achieve together, which is the most important question for economy-wide planning.

The bill also requires the Department to incorporate aircraft-borne estimates of methane emissions from landfills into the GGRA Plan and to require landfill operators to take various actions in response to those estimates. The Department recognizes the value of aircraft-borne estimates and continues to fund the University of Maryland's (UMD) work to gather those estimates. The Department and UMD's researchers continue to collaborate on how those estimates can improve Maryland's GHG management. However, those estimates cannot replace the facility-level estimates the Department currently uses for regulatory purposes and for the GGRA Plan. The Department requires estimates that are (1) specific to a

[2] "Pursuant the modalities, procedures and guidelines (MPGs) for the transparency framework for action and support adopted by decision 18/CMP.1, Parties agreed to use the 100-year time-horizon GWP values from the Fifth Assessment Report of the IPCC (see table 8.A.1), or 100-year time-horizon GWP values from a subsequent IPCC assessment report as agreed upon by the CMA, to report aggregate emissions and removals of GHGs, expressed in CO2 eq (decision 18/CMA.1, annex, paragraph 37)."
https://unfccc.int/process-and-meetings/transparency-and-reporting/methods-for-climate-change-transparency/common-metrics

facility and (2) annual for those purposes. Aircraft-borne measurements do not provide estimates specific to a particular landfill or other source, since they measure methane emitted from numerous upwind sources and areas, and do not provide annual estimates since they only provide snapshots in time that are heavily dependent upon immediate conditions including weather. The Department recently collaborated with atmospheric researchers to evaluate the linkages between top-down aircraft-based methane measurements and bottom-up GHG emission inventory methods. A scientifically defensible approach for reconciling the differences could not be identified at this time. As written, the bill does not give the Department the ability to vet the scientific or practical suitability of the aircraft measurements.

Regulations

The bill would also require the Department to adopt regulations establishing surface methane emission standards for municipal solid waste (MSW) landfills by January 1, 2024. The regulation under this bill is required to be at least as stringent as the California Landfill Methane Regulation. In February 2020, the U.S. Environmental Protection Agency (EPA) partially disapproved of California's regulation because it did not incorporate certain provisions of the EPA Emission Guidelines. While the Department believes that there are many beneficial provisions contained within California's regulation, there are serious negative implications inherent in adopting certain requirements in the California Landfill Methane Regulation, which have not been approved by EPA. MDE is developing proposed methane emissions regulations that would include approved stringent requirements found in the California regulations, be more stringent than current federal standards, and also meet federal emission guidelines that the state needs to submit to EPA for approval.

Operational Impact of Bill Provisions

In addition to the Department's concerns noted above, SB 528 would have a significant impact on the Department in several ways. The first impact is tied to the increase in the GHG emissions reductions to 60% from 2006 levels by 2030. Under the bill MDE would be required to adopt the first of two new plans by December 31, 2023, adopt regulations, and implement programs that reduce statewide GHG emissions to meet these more stringent emission reduction levels. The revised 2030 GHG reduction goal would require that MDE repeat the comprehensive emissions and economic impact analysis included in the current GGRA plan process using extended contracts with emissions and economic impact modelers. As noted above, for the 2030 GGRA Plan, emissions modeling was done on an economy-wide scale, consistent with best methodological practices, and best available models. SB 528 requires that emissions reductions be calculated for each individual measure included in the plan, despite the fact that relevant measures profoundly interact with one another, so there are not any independently attributable impacts. MDE can, however, estimate theoretical independent impacts by supplementing its economy-wide analysis approach with additional modeling scenarios that each evaluate the presence or absence of individual measures. MDE recently contracted for supplemental analysis to explore the emissions impact for a limited number of the most significant programs. The Department notes that, while the supplemental analysis is useful, the bill's required measure by measure analysis is problematic due to the interactions among measures. A full analysis of every one of the dozens of measures in the GGRA Plan would be a substantial and expensive undertaking.

SB 528 would establish a new Just Transition Employment and Retraining Working Group under the MCCC to perform various tasks, including a study, provide recommendations, and a report to the Commission and General Assembly. The working group would be staffed by MDE. The bill would also modify § 1–701 and § 1-702 of the Environment Article to require the Department, in consultation and coordination with the Commission on Environmental Justice and Sustainable Communities (CEJSC), to adopt a methodology to identify communities disproportionately affected by climate change; develop specific strategies to address environmental justice concerns, reduce emissions of GHGs and co–pollutants, and build climate equity and resilience within disproportionately affected communities; and establish goals for the percentage of state funding for GHG emission reduction measures that should be used for the benefit of disproportionately affected communities. However, both commissions are volunteer bodies with other responsibilities, so the majority of the work required under this bill would be performed by MDE. The bill would also require MDE to perform an annual analysis of spending by all state agencies on GHG reduction programs, including an evaluation of the portion of spending that benefits disadvantaged communities, according to criteria established by the CEJSC.

Under the bill, there would be a requirement for county boards of education to purchase or use only zero-emission vehicle (ZEV) school buses beginning in FY24. The requirements to buy or use school buses that are ZEVs do not apply if MDE

determines that there are no available ZEV school buses that meet the performance requirements for the county board's use, or if the county board is unable to obtain federal, state, or private funding sufficient to cover the incremental costs associated with contracting for the purchase or use of ZEV school buses. While MDE has staffing for our current programs, the new working group of the MCCC, the additional tasks required of the CEJSC, and implementation of the ZEV school buses provisions, would cause additional workload on the Department.

This bill would create a new subtitle- "Building Emissions Standards" under Title 2 of the Environment Article and would require that MDE establish building emissions standards for covered buildings that are 25,000 square feet or larger, which may include commercial, multifamily, and other types of buildings. Additionally, there are various GHG reduction requirements and timelines in the bill for state-owned and non-state-owned buildings. Beginning in 2025, owners of covered buildings would be required to report to MDE on the direct emissions from buildings. MDE would be required to adopt regulations that include: flexibility to owners of covered buildings to comply with building emissions standards; an alternative compliance pathway allowing an owner to pay a fee for building emissions that exceed the standards; and financial incentives recommended by the Building Energy Transition Implementation Task Force. Creating a building emissions standard was a key recommendation in the MCCC's 2021 Annual Report.

As mentioned above, the bill would also create a Building Energy Transition Implementation Task Force (Task Force). The goals of the Task Force would primarily focus on GHG-focused policy recommendations and the development of a plan to retrofit existing buildings to comply with Building Standards. The Task Force would study and make recommendations regarding the development of complementary programs, policies, and incentives that aim at the reduction of GHGs in buildings. The Task Force would also develop a plan for funding the retrofit of covered buildings to comply with standards.

MDE would also need to develop a program to regulate covered buildings throughout the state by establishing regulations with reduction goals and enforcing those goals, including requiring annual reports. The Department does not know precisely how many buildings would be covered, but a conservative estimate is at least 10,000 individual buildings. The legislation does not specify when MDE would be required to adopt regulations pertaining to this section and is vague as to whether both reporting requirements and building emission standards would need to be established to implement this section. Though the Department currently has adequate and sufficient staff and resources to conduct its mission effectively and efficiently, any additional legislatively-mandated program or regulation, such as this, will likely hamper our efficiency, force us to divert resources away from current core competencies, and likely disrupt customer service and/or diminish services.

Thank you for your consideration. MDE is ready and willing to discuss compromises to the amendments offered below, but does feel strongly that the amendments will be beneficial to the state. We will monitor SB 528 during the committee's deliberations, and I am available to answer any questions you may have. Please feel free to contact me at 410-260-6301 or at tyler.abbott@maryland.gov .

Sincerely,

Tyler Abbott

cc: George "Tad" Aburn, Director, Air and Radiation Administration
Mark Stewart, Manager, Climate Change Program

MDE Amendments to SB 528 (Climate Solutions Now Act of 2022)

MDE added language in CAPs and blue font

Amendment 1: Clarify targets as net emissions targets.

1) **Insert** "net" in each instance of "statewide **NET** greenhouse gas emissions."

Amendments 2-3: Identify a potential pathway to achieve a 60% reduction in net emissions by 2030.

2) In § 2–1204.1 **Amend**: "The State shall reduce statewide **NET** greenhouse gas emissions by [40%] ~~**60%**~~ **AT LEAST 50%** from 2006 levels by 2030."

3). In § 2–1205(b)-(c) **Amend**: "On or before [December 31, 2018] **JUNE 30, 2023**, the Department shall: 1) Submit a proposed plan that reduces statewide **NET** greenhouse gas emissions by [40%] ~~**60%**~~ **AT LEAST 50%** from 2006 levels by 2030 **AND IDENTIFIES A POTENTIAL PATHWAY THAT REDUCES STATEWIDE NET GREENHOUSE GAS EMISSIONS BY 60% FROM 2006 LEVELS BY 2030** to the Governor and General Assembly; and "The Department shall, on or before December 31, [2019] **2023**, adopt a final plan that [reduces]: (I) **REDUCES** statewide **NET** greenhouse gas emissions by [40%] ~~**60%**~~ **AT LEAST 50%** from 2006 levels by 2030; **AND (II) IDENTIFIES A POTENTIAL PATHWAY THAT REDUCES STATEWIDE NET GREENHOUSE GAS EMISSIONS BY 60% FROM 2006 LEVELS BY 2030**."

Amendments 4-7: Keep Maryland in compliance with national and international greenhouse gas accounting standards.

4) In § 2–1205(E)(3) **Strike**: "**SHALL USE THE GLOBAL WARMING POTENTIAL FOR METHANE OVER A 20–YEAR TIME HORIZON, AS ACCEPTED IN THE MOST RECENT ASSESSMENT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IN ESTIMATING THE STATE'S GREENHOUSE GAS EMISSIONS REDUCTIONS**."

5) In § 2–1205(E)(5) **Strike**: "**SHALL INCLUDE SPECIFIC ESTIMATES OF THE REDUCTIONS EXPECTED FROM EACH GREENHOUSE GAS EMISSIONS REDUCTION MEASURE INCLUDED IN THE PLAN**."

6) In § 2–1206(9) **Strike**: "**INCORPORATE TOP–DOWN METHANE EMISSIONS DATA ACQUIRED THROUGH AIRCRAFT OBSERVATIONS**."

7) In §2–407 **Strike**: the entire subtitle.

Amendment 8: Do not require Maryland to adopt the California Landfill Methane regulation

7) In §2–408(B) **Strike**: "**THE REGULATIONS SHALL BE AT LEAST AS STRINGENT AS THE CALIFORNIA LANDFILL METHANE REGULATION ADOPTED ON JUNE 17, 2010**."