SB 424_CBF_FAV.pdf
Uploaded by: Doug Myers
Position: FAV

CHESAPEAKE BAY FOUNDATION

Environmental Protection and Restoration
Environmental Education

Senate Bill 424

Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act)

Date: February 22, 2023
To: Budget and Taxation Committee

Position: Support
From: Doug Myers
Maryland Senior Scientist

Chesapeake Bay Foundation (CBF) **SUPPORTS** SB 424 which requires Department of General Services to ascertain the global warming potential of cement and concrete used for construction of state buildings, highways and other similar projects. The bill also requires the Department to set a maximum global warming potential for certain cement and concrete and project that maximum in bidding documents for state projects.

This bill importantly recognizes that greenhouse gas emissions occur throughout the lifecycle of a project, including the materials used, how they are manufactured and the distances they travel from point of origin to where they are used. Cement and concrete, in particular, have high greenhouse gas emissions associated with their manufacturing. According to EPA, Carbon dioxide equivalent emissions from cement manufacturing exceed 65 M metric tons/year[1].

This bill also allows for the consideration of the accounting of travel distances in the total global warming potential of a material. From this standpoint, the bill could provide favorable conditions for Maryland companies and companies within the region that would transport the materials few miles.

As with any program to reduce greenhouse gas emissions, CBF points out that doing so also reduces emissions of nitrogen oxides which become a source of nitrogen loading to the Bay not assigned to any sector for reduction.

CBF urges the Committee's FAVORABLE report on SB 424.

For more information, please contact Matt Stegman, Maryland Staff Attorney, at mstegman@cbf.org.

[1] https://www.epa.gov/trinationalanalysis/greenhouse-gas-reporting-cement-manufacturing-sector

SB 424 - MoCo_Fitzgerald_FAV (GA 23).pdf
Uploaded by: Garrett Fitzgerald
Position: FAV

Montgomery County
Office of Intergovernmental Relations

ROCKVILLE: 240-777-6550 **ANNAPOLIS: 240-777-8270**

SB 424 **DATE: February 22, 2023**

SPONSOR: Senators Elfreth and Feldman

ASSIGNED TO: Budget and Taxation Committee

CONTACT PERSON: Garrett Fitzgerald (garrett.fitzgerald@montgomerycountymd.gov)

POSITION: Favorable (Department of Environmental Protection)

Public Projects - Global Warming Potential of Materials (Buy Clean Maryland Act)

Traditional production of cement and concrete results in significant greenhouse gas (GHG) emissions. In recent years, industry has learned how to create cement and concrete using materials and methods that result in substantially lower GHG emissions. Selecting cement and concrete with relatively low GHG impacts, or 'global warming potential,' can be a useful strategy to help achieve Maryland's climate goals.

This bill would use the purchasing and standard-setting power of the State to drive industry to produce cement and concrete with lower GHG emissions. The bill would require the State's Department of General Services (DGS) to establish maximum acceptable global warming potential for any cement or concrete mixture the State (or a contractor of the State) can use in constructing a public project.

The bill would require that that the maximum acceptable global warming potential be based on the industry average for that material, ensuring feasibility. DGS would review the maximum acceptable global warming potential every three years and adjust as appropriate. The bill allows DGS to waive requirements for a given public project in the event of technical infeasibility, cost, delay, or lack of a competitive bidding market.

This legislation offers a feasible and important opportunity for the State to lead the way on climate change by reducing GHG emissions associated with cement and concrete. The standards established by DGS will also have the potential to be replicated and applied by other state and local governments, helping to transform industry and driving greater impact.

We respectfully request that the Budget and Taxation Committee issue a favorable report on Senate Bill 424.

SB424 - Buy Clean Maryland - LCV + Sierra Club.do
Uploaded by: Kristen Harbeson
Position: FAV

MARYLAND LEAGUE OF CONSERVATION VOTERS

SIERRA CLUB MARYLAND CHAPTER

February 22, 2023

SUPPORT SB424: Public Projects - Global Warming Potential of Materials

Mr. Chair and Members of the Committee:

Maryland League of Conservation Voters and the Sierra Club of Maryland support SB424, "Public Projects - Global Warming Potential of Materials," and we thank Senator Elfreth for her leadership on this issue. The bill will require the Department of General Services to limit the amount of greenhouse gas emissions from any cement or concrete mixture used in certain public projects by establishing a "maximum global warming potential" for such products.

In 2022, the Maryland General Assembly passed the Climate Solutions Now Act, which sets the State on a path toward dramatically reducing our carbon emissions by the year 2031, and achieving net-zero emissions by 2045. To reach these ambitious but achievable goals, Maryland must take every opportunity to cut our greenhouse gas emissions. HB261 is a meaningful step toward this goal.

Cement contributes up to 8% of greenhouse gases worldwide. Emissions are tied to the presence of "clinker," which is a key component of traditional cement-making, and emits the largest amount of CO2 in the cement-making process. While the United States is a relatively small part of the cement market, one of the nation's largest producers has a plant in Hagerstown, Maryland – a plant which is leading the way in adopting alternative cement-making practices that significantly reduce carbon emissions, by using an alternative to the carbon-heavy "clinker," and more energy efficient processes.

SB424 offers the Maryland General Assembly the opportunity to put our state government in a position of leading the way for private companies by giving preference to these improved practices. This will achieve two critical outcomes: supporting a Maryland business that has shown important industry leadership; and reducing carbon emissions from public projects. Moreover, this bill would also bring environmental and health benefits to local communities that host concrete manufacturing plants by supporting alternatives that reduce other emissions during the production cycle.

Communities with cement manufacturing plants are not only overburdened by the harmful emissions released during the industrial process of producing concrete, but their residents also suffer from diesel emissions, and noise and public safety concerns associated with the heavy diesel trucks that serve concrete operations daily. While legislation is pending which would help to transition the fleet of medium and heavy duty trucks to zero-emission electric vehicles, this process will take time, and this pollution will remain a concern for these communities. We urge the Maryland General Assembly to take these cumulative impacts into account to ensure that no community in Maryland is disproportionately impacted by pollution and other environmental harms.

We urge a favorable report on SB424.

SB0424_IndivisibleHoCoMD.pdf
Uploaded by: Michael Loll
Position: FAV

SB0424– Public Projects - Global Warming Potential of Materials (Buy Clean Maryland Act)

Testimony before the Budget and Taxation Committee

February 22, 2023

Position: Favorable

Chair Guzzone, Vice Chair Rosapepe, and members of the committee, my name is Michael Loll, and I represent the 700+ members of Indivisible Howard County. We are providing written testimony today in ***strong support of SB0424.*** This bill would require the state of Maryland to set maximum acceptable green house gas emission standards for cement and concrete used in state construction projects.

As of 2018, cement was responsible for 8% of the world's CO_2 emissions (https://www.chathamhouse.org/2018/06/making-concrete-change-innovation-low-carbon-cement-and-concrete). The cement industry is the third largest emitter of carbon dioxide, behind the *nations* of China and the United States (https://www.bbc.com/news/science-environment-46455844). Clearly, reducing the carbon footprint of cement and concrete would go a long way in our fight against the climate crisis.

While the concrete and cement industries have been slowly reducing their emissions through increased energy efficiency, these gains have not been enough to significantly reduce their overall green house gas output. Fundamental changes in cement and concrete manufacture – bio-concrete (https://www.giatecscientific.com/education/bio-concrete/), substituting new materials for components presently in use, producing cement using lower temperature processes (https://theconstructor.org/concrete/green-cement-types-applications/5568/), and other methods (https://www.thomasnet.com/articles/plant-facility-equipment/what-is-green-concrete/) – are needed to make these industries carbon neutral. Unfortunately, many of these newer procedures and tehcnologies are either undeveloped or not currently scalable.

This is where the role of government comes in. By requiring the use of lower carbon emitting building materials in its own projects, the state can help create a demand for them. Demand creates markets, and markets innovate to bring products and services into being. We have seen similar stories take place in the development of GIS, space flight, remote sensing, and other new technologies by the federal government. The same thing happens at the state level. Colorado recently passed a law that mandates the use of lower carbon building materials in state projects (https://rmi.org/colorado-passes-embodied-carbon-legislation/).

Thank you for your time and attention.

We encourage a favorable report.

Michael Loll
Columbia, MD

Elfreth_FAV_SB424.pdf
Uploaded by: Sarah Elfreth
Position: FAV

SENATOR SARAH ELFRETH
Legislative District 30
Anne Arundel County

Budget and Taxation Committee
Subcomittees
Capital Budget
Pensions
Chair, Public Safety, Transportation, and Environment

Joint Committee on the Chesapeake and Atlantic Coastal Bays Critical Area
Chair, Joint Subcommittee on Program Open Space/Agricultural Land Preservation

THE SENATE OF MARYLAND
ANNAPOLIS, MARYLAND 21401

James Senate Office Building
11 Bladen Street, Room 104
Annapolis, Maryland 21401
410-841-3578 · 301-858-3578
800-492-7122 Ext. 3578
Fax 410-841-3156 · 301-858-3156
Sarah.Elfreth@senate.state.md.us

February 22, 2023

Testimony in Favor of SB0424
Public Projects - Global Warming Potential of Materials (Buy Clean Maryland Act)

Chairman Guzzone, Vice-Chair Rosapepe, and members of the Budget & Taxation Committee.

I respectfully request a favorable report of Senate Bill 424 to ensure that our State moves towards better utilizing low carbon concrete in our fight to reduce greenhouse gas emissions.

Cement is the main ingredient in concrete and the greenhouse gas emissions produced through the cement production process continue to be a key contributor to the increase in these emissions both globally and here in Maryland. Estimates indicate that cement production represents about 8% of the world's carbon dioxide emissions[1]. Put a different way, if the concrete industry were a country in and of itself it would be within the top 5 of global emission producing nations in the world[2]. Furthermore, in New Jersey, a State similar to Maryland in a variety of ways, cement production represents roughly 12% of emissions[3]. You will hear today from industry experts who will talk in more detail about how this Bill will help reduce the environmental footprint of cement and concrete without sacrificing performance and durability.

It is clear that, considering these levels of emissions, we have an obligation to do more to mitigate climate effects that this industry is generating. But there is good news: there exists a less environmentally harmful means of producing concrete and there are Maryland-based producers who are helping to lead this effort. Additionally, the Federal government and States across the nation (including here in Maryland) have begun to take action to better mitigate the emissions of this industry through the procurement system.

Federally, President Biden in December of 2021 issued an Executive Order to require net-zero emissions for Federal procurement no later than 2050. Most importantly, the Order also included

[1] https://www.bbc.com/news/science-environment-46455844
[2] https://phys.org/news/2021-10-concrete-world-3rd-largest-co2.html
[3] https://psci.princeton.edu/tips/2020/11/3/cement-and-concrete-the-environmental-impact

a "Buy Clean" policy[4] for Federal procurement to promote the use of construction materials with lower embodied emissions through the creation of an inter-departmental "Buy Clean" Task Force[5].

Other States have also implemented Buy Clean policies – including California, Colorado, Oregon, Hawaii, and New York[6]. Furthermore, Maryland has already started this conversation through the Climate Solutions Now Act of 2022 (SB528 22') which required the Maryland Green Building Council (MGBC) to look in-depth at how to incentivize cleaner concrete through our procurement policy – most notably through the use of Environmental Policy Declarations (EPD's) to measure the climate impact of concrete.

This legislation builds on the MGBC report, as well as the actions that the Federal Government and fellow States have taken, to take a measured approach at implementing Buy Clean policies here in Maryland.

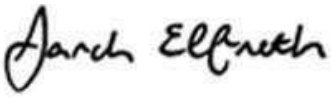
This legislation as drafted will:

1. Require a bidder on an eligible project to submit to DGS, for each eligible material (concrete in this legislation), an EPD for the product. We do however, also authorize the Department to waive the EPD requirements under certain circumstances.
2. Require the Department to set a maximum acceptable Global Warming Potential for each category or eligible materials (concrete in this legislation) to guide their procurement rules. This will work in tandem with the EPD's to ensure we are using cleaner concrete. We also require the Department to update the Global Warming Potential in 2028 and every three years after.
3. Require reports starting in 2025 from DGS on anything that the Department has learned and any obstacles the Department has had with these requirements.

We recently met with DGS to discuss this legislation. I am happy to be working with them on potential amendments to alleviate pressure on implementation, by:

1. Adjusting the timelines on the legislation to primarily give the Department more time to utilize Environmental Product Declarations
2. Striking the word "facility-specific" from page 4 line 17.
3. Only requiring the use of the EPD-based procurement process for projects that are also required to meet the Maryland High Performance Green Building standards.

Sincerely,



Sarah Elfreth

[4] https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/08/fact-sheet-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/

[5] https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/15/fact-sheet-biden-harris-administration-advances-cleaner-industrial-sector-to-reduce-emissions-and-reinvigorate-american-manufacturing/

[6] Maryland Green Building Council 2022 Report

Testimony_SB0424.pdf
Uploaded by: Kevin Lang
Position: UNF

Testimony SB0424

Requiring public works projects to use materials that adhere to a new and nebulous set of criteria is certain to increase both cost and time to completion. Given the woeful state of our public infrastructure, heaping additional costs and complications atop projects is untenable.

SB 424_MAA_UNF.pdf
Uploaded by: Rachel Clark
Position: UNF

MARYLAND ASPHALT ASSOCIATION

SINCE 1954

February 22, 2023

Senate Guy Guzzone, Chair
Budget and Taxation Committee
3 West, Miller Senate Office Building
Annapolis, MD 21401

RE: Senate Bill 424 – UNFAVORABLE – Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act)

Dear Chair Guzzone and Members of the Committee:

The Maryland Asphalt Association (MAA) is comprised of 19 producer members representing more than 48 production facilities, 25 contractor members, 25 consulting engineer firms and 41 other associate members. MAA works proactively with regulatory agencies to represent the interests of the asphalt industry both in the writing and interpretation of state and federal regulations that may affect our members. We also advocate for adequate state and federal funding for Maryland's multimodal transportation system.

Senate Bill 424 requires the Department of General Services to establish a maximum acceptable global warming potential for any cement or concrete mixture used in the construction of a public project.

MAA appreciates the sponsor's intent and laudable goals with this legislation, but at this current juncture we cannot support it. We strongly feel that the market should dictate the types of materials needed for construction projects. If these vague determinations are set, we have serious concerns that it will make it nearly impossible to adhere to. Setting preferences also pits producers against each other, giving an unfair advantage to those that meet the requirements. Additionally, we are unsure why this program will reside within the Department of General Services, and not with the Department of Transportation (MDOT). Should this bill pass, we firmly believe it needs to be housed within MDOT, who is better suited to make these determinations about the construction industry.

We appreciate you taking the time to address this issue and we respectfully urge an unfavorable report on Senate Bill 424.

Sincerely,

G. Marshall Klinefelter

Marshall Klinefelter
President
Maryland Asphalt Association

SB 424_MTBMA_UNF.pdf
Uploaded by: Rachel Clark
Position: UNF

February 22, 2023

Senate Guy Guzzone, Chair
Budget and Taxation Committee
3 West, Miller Senate Office Building
Annapolis, MD 21401

RE: Senate Bill 424 – UNFAVORABLE – Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act)

Dear Chair Guzzone and Members of the Committee:

The Maryland Transportation Builders and Materials Association (MTBMA) has been and continues to serve as the voice for Maryland's construction transportation industry since 1932. Our association is comprised of 200 members. MTBMA encourages, develops, and protects the prestige of the transportation construction and materials industry in Maryland by establishing and maintaining respected relationships with federal, state, and local public officials. We proactively work with regulatory agencies and governing bodies to represent the interests of the transportation industry and advocate for adequate state and federal funding for Maryland's multimodal transportation system.

Senate Bill 424 requires the Department of General Services to establish a maximum acceptable global warming potential for any cement or concrete mixture used in the construction of a public project.

MTBMA appreciates the sponsor's intent and laudable goals with this legislation, but at this current juncture we cannot support it. We strongly feel that the market should dictate the types of materials needed for construction projects. If these vague determinations are set, we have serious concerns that it will make it nearly impossible to adhere to. Setting preferences also pits producers against each other, giving an unfair advantage to those that meet the requirements. Additionally, we are unsure why this program will reside within the Department of General Services, and not with the Department of Transportation (MDOT). Should this bill pass, we firmly believe it needs to be housed within MDOT, who is better suited to make these determinations about the construction industry.

We appreciate you taking the time to address this issue and we respectfully urge an unfavorable report on Senate Bill 424.

Thank you,

Michael Sakata
President and CEO
Maryland Transportation Builders and Materials Association

MRMCA Opposes SB0424 Written Testimony 2-17-23.pdf
Uploaded by: Thomas Evans
Position: UNF

February 17, 2023

To: Maryland Senate
Budget and Taxation Committee
Miller Senate Office Building - 3 West Wing
11 Bladen Street, Annapolis, Maryland 21401

Re: Oppose SB0424: Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act)

As Executive Director of the Maryland Ready Mix Concrete Association (MRMCA), I write this letter of opposition to SB0424, Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act) on behalf of the ready mixed concrete industry in Maryland.

The cement and concrete industry welcome the conversation and want to meet with you to discuss these Bills and other legislation that aims to lower the carbon footprint of construction materials. Local concrete producers are at the forefront of innovation and technology to optimize concrete mixtures for the betterment of all Marylanders. The MRMCA agrees with the intent of the legislature to curb greenhouse gas (GHG) emissions of our public infrastructure projects. However, green building initiatives need to focus on more than one aspect—beyond simply embodied carbon. The most effective strategy for ensuring a sustainable, built community is to consider the full life cycle of the project.

The economic impact of the cement and concrete industry in Maryland is significant. Collectively, we employ over 15,000 Marylanders and our total state revenue is over $1 billion annually. The concrete industry has operations in nearly every community in Maryland and therefore, our industry has an impact on all Maryland voters.

Two key points of our industry's opposition to SB424 are that it only identifies "cement or concrete mixture" as "eligible material; and it does not address CO2 emissions for operation, maintenance, and the longevity of the structure.

Additional reasons for opposing these Bills are attached in a separate document.

Please give SB0424 an UNFAVORABLE report and be sure to invite MRMCA to the table to discuss Maryland's sustainability goals moving forward.

Respectfully,

Thomas Evans
Executive Director
MRMCA
P.O. Box 617, Frederick, MD 21705
O: 301-694-4899
E: tom@marylandconcrete.com

MRMCA Position Re MDGBC 5 Tasks for CSNA of 2022.p

Uploaded by: Thomas Evans

Position: UNF

Maryland Ready Mix Concrete Association (MRMCA)

MRMCA Position Statement for Low Carbon Concrete (ref MGBC Tasks for CSNA 2022)

This MRMCA Position Statement is provided to help guide the Maryland Green Building Council regarding the examination of the 5 points outlined below as stated in the Climate Solutions Now Act of 2022. For your use, as referenced throughout this document, this is a link to NRMCA Guide Specifications for Reducing Embodied Carbon.

As stated in the Climate Solutions Now Act of 2022 CSNA of 2022… the bill requires the Maryland Green Building Council (MGBC) to examine:

(1) the use of environmental product declarations to measure the climate impact of concrete procured by the State;

(2) the use of performance incentives to encourage adoption of low-carbon materials and methods by concrete manufacturers that provide concrete for State-funded projects;

(3) the establishment of an expedited product evaluation, testing, and approval protocol for low-carbon concrete products;

(4) the implementation of performance-based specification standards for concrete, as specified;

(5) the use of methods of compliance, including maximum cement content specifications and specifications based on maximum potential for global warming.

In examining these topics, MGBC must consult with (1) any relevant associations that set industry standards for the procurement of low-carbon concrete and (2) affected contractors and subcontractors to consider both environmental and health and safety impacts. MGBC must report its findings and recommendations to the Governor and the General Assembly by December 1, 2022.

(1) the use of environmental product declarations to measure the climate impact of concrete procured by the State;

MRMCA Position / Background / Supporting Information

The State could start by collecting EPDs from Maryland cement/concrete producers for a period of no less than 12 months to establish a baseline for benchmarking levels for program going forward

Environmental Product Declarations (EPDs) are an important tool to understand a product's environmental impacts including only embodied carbon emissions. The State of Maryland should establish and communicate the correct intent and use of EPDs. EPDs are not to be used, nor is it appropriate, for a comparison between different building materials for the purposes of procurement or building material selection. For example, concrete cannot be compared to asphalt simply by comparing the number in their EPD's as they are not measuring the same data.

The current North American PCR for concrete and the EPDs that are developed from it are imperfect tools. They were established for credit achievement in green rating systems and not a comparison tool. The PCR lacks details and definitions of strength classes that are used in design, does not require performance application specificity such as flow rheology and cure time, and is limited in the accounting of impacts in other life cycle stages of the product.

Not all EPDs, even within one type of material and using the same PCR, have the same granularity of the underlying data. For example, an EPD of one concrete mix may have specific supply chain-specific data for some of the constituent components, disclosing detailed impacts from a specific cement used in that concrete mix. Conversely, another mix's EPD may not have access to that cement-specific data and rely on less granular industry average data for that ingredient.

While Cradle-to-Gate EPD evaluations are a focus on the up-front carbon impacts after a design is completed, and are meaningful for carbon reduction decision making, Cradle-to-Grave Whole Building/Project Life Cycle Assessment (WBLCA) analyzes all life cycle phases and should be used by design teams to evaluate structural alternatives, for confirming early design decisions. Vetted early design decisions, including long-term durability, resiliency, and re-use impacts, should be considered WBLCA decision making to most holistically achieve carbon optimized construction.

(2) the use of performance incentives to encourage adoption of low-carbon materials and methods by concrete manufacturers that provide concrete for State-funded projects;

MRMCA Position / Background / Supporting Information

The last ten years have seen rapid and exponential interest in disclosing the environmental impacts of products, and in particular, building materials. Environmental Product Declarations (EPDs) are the driving force of much of this disclosure, particularly the impacts of greenhouse gasses. While the uptake of published EPD from Maryland's manufacturers is starting – only a few unique products currently in the Embodied Carbon in Construction Calculator (EC3) Database – it's important to realize that this is concentrated in only a few industries at a few manufacturing locations or batch plants.

Unlike steel or wood or other materials that are shipped from a point source in a final finished form, the significance of concrete is that it is a dynamic material that can be modified to adopt to construction scheduling, production, and overcome design challenges to facilitate efficient and timely construction. Mix design changes and materials used can change while the project is underway to accommodate unanticipated, necessary or desirable changes. Any procurement regulation would fundamentally preclude necessary flexibility during construction to offset delays by weather, material shortages or other developments. There are other challenges: a procurement approach prevents fulfilling the objectives of the Act and equally as important, for a state structure, may significantly complicate construction and delivery of a publicly funded project on time or within budget.

Providing financial assistance to manufacturers to facilitate the production of environmental product declarations and the reporting mechanism based on life-cycle analysis will improve the state's ability to make purchasing decisions that align with state carbon reduction goals, will ensure that small manufacturers and rural areas are not put at a competitive disadvantage in state contracting as a result of the requirements of this law, and and will allow rural areas to successfully participate and support rural carbon reduction goals.

1. Provide **matching grant funds** for smaller building material manufacturers in Maryland to produce product-specific Environmental Product Declarations. Since producing EPDs require a collection of 12 months of data, funding should not be delayed so smaller manufacturers can begin this data collection now to be ready for future disclosure requirements and maintain their long-term competitiveness. The external costs for a single facility to produce EPD's is comprised of data collection and analysis costs (site and facility specific), EPD generation by a EPD provider approximate $10,000, plus subscription fees, third party verification costs of $3,000 or more with ongoing annual maintenance fees of $2,000 per facility.

2. **Fund a publicly accessible database** of completed projects with embodied carbon, material type and quantity data; the project name, the project team members, and suppliers/manufacture names shall be redacted. PCR and EPDs are regularly updated and need to be maintained to ensure fair comparisons between projects, the database should also include more granular information such as the type(s) of the structural systems, the types of concrete applications, and the project location.

3. **Carbon reduction targets incentivize project carbon performance.** Setting a project-specific carbon budget can provide both rigor (measurement against published industry averages) with flexibility (the ability for contractors to offset higher emitting materials with lower emitting materials in equal measure). Require quantifiable embodied carbon budgets and identify the baseline for measuring the budgets. In addition, consider requiring quantifiable carbon reduction targets for operational carbon, such as obtaining energy use intensity (EUI) targets below code-required levels as material decisions can affect operation carbon emissions.

   Upon completion of the project, the project analysis shall calculate and summarize the resulting embodied carbon levels as achieved by the project.

   (i) If the project meets the published project carbon reductions, a bonus of X% shall be paid and distributed to the project contractor and his contributing material suppliers and others upon verification of the embodied carbon reduction as contributed to the project.

(ii) If the project exceeds the published project carbon reductions, a bonus of X+% shall be paid and distributed to the project contractor and his contributing material suppliers and others upon verification of the embodied carbon reduction as contributed to the project.
(iii) A standard bonus formula for exceeding embodied carbon reductions shall be determined and published by the Dept of General Services and incorporated by the awarding agency into their state funded construction project specifications

4. **Reward Manufacturing and Transportation Reductions.** Provide a financial/point bonus during bid award analysis for manufacturing facilities which have reduced manufacturing energy usage and process emission through participation in programs such as Energy Star Plant Certification, the Concrete Sustainability Council or conversion of diesel equipment and delivery trucks to either renewable diesel, CNG (RNG) or electric.

(3) the establishment of an expedited product evaluation, testing, and approval protocol for low-carbon concrete products;

MRMCA Position / Background / Supporting Information

The State should specify minimum qualifications for the concrete producer, installer, and testing facility. See Section 1.7 of NRMCA Guide Specification.

Concrete is made from local materials and its performance can be affected by weather conditions, variability of materials, delivery, placing, handling, and testing. Although the materials used to make concrete meet rigorous standards, the variability can be quite high. Concrete rarely tests well when proper manufacturing, installation, and testing protocols are not followed. If test results consistently show lower strength, then the only way to overcome that is to increase overdesign, which generally raises cementitious material content.

For example, if poor testing increases the necessary over design from 600 to 1000 psi, the content of the cementitious materials would increase by roughly 40 lbs to 4,000 psi, increasing the embodied carbon footprint by as much as 6%.

This results in increased cost and does not support sustainable development. Selection of testing agencies should be based on quality of work and having certified personnel conducting tests. Test reports should be distributed to producers as soon as available to help identify potential problems early.

ACI 318, ACI 301, and ASTM C94 require that testing agencies contracted to perform acceptance testing should comply with ASTM C1077. This clause is included in the AIA MasterSpec. Compliance with ASTM C1077 can be a documented laboratory inspection by organizations such as the Cement and Concrete Reference Laboratory (CCRL) or accreditation by the AASHTO Accreditation Program (AAP). These programs involve a thorough evaluation of laboratory equipment, procedures, personnel qualifications, and certifications and require participation in reference sample testing program to assure proficiency of testing. ASTM C1077 establishes the requirements and criteria for evaluating the proficiency of testing laboratories involved in testing concrete and aggregates.

Results of concrete testing are sensitive to how specimens are fabricated, cured, handled, and tested. Procedural requirements for acceptance testing are addressed in ASTM C94/C94M and the referenced standard practices and test methods. Field and laboratory procedures that conform to established standards are essential to achieving reliable results. Deviations from standardized procedures will most often result in unacceptable results that increase project costs and delay schedules. Hence, technician certification is essential. Equivalent certifications to ACI should include a component whereby the technician physically demonstrates the performance of the test method and practices, and written examination on the content of the applicable standards.

Many ready mixed concrete companies have well equipped laboratory facilities and can perform most of the common tests on concrete and concrete materials. A separate testing agency should not be required if the laboratory can perform mixture development and most of the standard test methods. There may be some tests that could be contracted out to an independent testing agency to perform.

Many specifications include a clause requiring a single source of cement for the duration of the project. It is sometimes not practical to use single sources of cementitious materials for the duration of the project. Even single supply sources of cementitious materials vary over time and in periods of high demand there may be some changes in point sources of manufacture of cement or the collection of supplementary cementitious materials (SCMs) such as fly ash, slag cement, and silica fume. Cement companies and suppliers of supplementary cementitious materials attempt to control the uniformity of products shipped to the concrete producer. It is also the responsibility of the concrete supplier to make minor changes to concrete mixture proportions to address these material source variations. These minor adjustments should not typically require re-submittals. Single source is appropriate for architectural concrete and concrete producers will generally isolate a sufficient supply of such materials for the duration of a project.

(4) the implementation of performance-based specification standards for concrete, as specified;

MRMCA Position for performance-based specifications:

- The engineer should minimize prescriptive requirements on concrete mixtures and construction means and methods and increase the focus on measurable performance attributes when appropriate.
- Avoid specifying maximum w/cm, air content, cement type requirements if they are not applicable to the anticipated service conditions of the structural members.
- The engineer should avoid specifying a maximum or target slump as it may impact constructability.
- The specification should avoid specifying minimum contents for cementitious materials. Likewise, a maximum cement content should not be specified for concrete mixtures. Cement content requirements vary considerably for constructability, early strength and other properties and should not be limited based on design strength of structural members.
- Do not restrict the minimum or maximum percentage of SCM except unless there is a particular requirement in local building codes.
- Avoid limiting the types of admixtures that can be used unless there is a specific reason. Listing brand name products should be avoided.

MRMCA Position / Background / Supporting Information

The proportions of ingredients used for concrete mixtures can have a significant influence on the environmental footprint of concrete, but this determination should not be limited to the mixture composition – the impacts to constructability, schedule, and performance of the structure must also be considered. Specifications for concrete in construction documents establish project requirements where the contractor and material suppliers must comply. Project specifications that adhere to industry standard specifications, such as *ACI 301 Specification for Structural Concrete*, generally applicable for buildings, are supportive of performance-based criteria and sustainable concrete construction and can be adopted by reference in a project specification. Concrete products must still meet the current life safety codes.

A **performance-based specification** outlines the characteristics of the fresh and hardened concrete, depending on the application and aspects of the construction process that are necessary. These requirements should not restrict innovations by the concrete producer or the concrete contractor. A **prescriptive specification**, on the other hand, imposes constraints on concrete mixture proportions or means and methods of construction.

Performance specifications should clearly specify the test methods and the acceptance criteria that will be used to verify and enforce the performance criteria. Performance specifications should provide the necessary flexibility to the contractor and producer to provide concrete mixtures that meet the performance criteria.

The State of Maryland is interested in a concrete structure that provides a long service life without significant defects and has a low environmental footprint, not necessarily how much cement it contains. Using a performance-based specification, the concrete producer is free to select the mixture proportions and is held responsible for meeting the performance criteria. Since performance specifications would allow for mixture optimization and mixture adjustments during the project, there is an incentive for the producer to invest in improved quality, technology and lab facilities. With a performance specification, a quality concrete producer can improve product quality, stimulate innovation, reduce construction cost and minimize construction time – while reducing environmental footprint.

Carbon Performance in Specifications Option:

For sustainability goals, the project team should establish a **carbon budget** for ALL materials including concrete on a project – this permits tradeoffs between different types of member requirements. Alternatively, reduction in carbon footprint relative to typical mixtures or industry benchmarks could be used. By establishing upfront that the project has a carbon reduction goal, it provides the concrete contractor and producer an indication that they should develop mix designs that not only meet the typical performance criteria for concrete, such as strength, durability and other physical properties, but they should also take into account concrete mixtures with lower carbon footprint than typical concrete mixtures. It also encourages the use of innovative products and processes to meet these goals.

(5) the use of methods of compliance, including maximum cement content specifications and specifications based on maximum potential for global warming.

MRMCA Position / Background / Supporting Information
The State should include a table in the specification that lists performance criteria, such as strength and exposure class, without limitations on material quantities. See Section 2.11 of the NRMCA Guide Specification.

Concrete is unique among building materials. Its formulation is highly influenced by its application. Design professionals and contractors have a greater influence on concrete formulation than they do with other building products. Concrete formulation has the greatest impact on the carbon footprint of concrete.

Imposing minimum or maximum cement content for different classes of concrete constrains the innovation of the concrete producer to optimize concrete mixtures, and can result in inherent incompatibility with other requirements of the specifications, such as strength or w/cm. These can result in unintended consequences, such as increased volume changes due to temperature or drying shrinkage that will result in cracking or reduced durability. It is a fallacy to assume that higher cement content results in improved durability. Minimum cement content requirements can impact cost and the environment with questionable benefits to quality, performance, and durability. On the other hand, attempts to force green construction should not set limits on maximum cement content. This could compromise constructability or performance of concrete in the structure resulting in reduced service life.

Additional Background / Suggestions / Recommendations:

Specify a target Global Warming Potential (GWP) for all the concrete on the project by using NRMCA Industry Wide Environmental Product Declarations and Benchmarks to compare proposed designs to a baseline (or benchmark). See Section 2.11 of NRMCA's Guide Specification. A calculation can be shown that the Global Warming Potential (GWP) of all the concrete supplied for the project will be lower than the GWP target.

- For each concrete mixture, supply a plant specific EPD. EPDs are third party verified reports listing environmental impacts of products. They list a multitude of environmental impacts including GWP. They are the basis for calculating the embodied carbon footprint for the building.
- The calculation showing that the GWP of the concrete supplied for the building is lower than the target shown in Section 2.11 is simple. Sophisticated LCA software can be used for this calculation, or the simple math equations can be used:

  Equation 1: GWPB = (GWPB1)(V1) + (GWPB2)(V2)…(GWPBn)(Vn)
  Equation 2: GWPP = (GWPP1)((V1))+(GWPP2)(V2)…(GWPPn)(Vn)
  Where:
    - GWPB = Global Warming Potential of Benchmark Building
    - GWPB1, GWPB2, etc. = Global Warming Potential of each different concrete mix or class of concrete on the project from the Benchmark Report
    - GWPP = Global Warming Potential of Proposed Building
    - GWPP1, GWPP2, etc. = Global Warming Potential of each proposed concrete mix or class of concrete as selected from the Industry-Wide EPD or from product specific EPDs if available at time of design (unlikely).
    - V1, V2, etc. = Volume of each different concrete mix used on the project.
    - n = Number of concrete mix designs or classes of concrete.

Whole Building LCA Option:
A better tool for evaluating projects is a Whole Building Life Cycle Assessment (WBLCA). The Life Cycle Assessment (LCA) will provide the cumulative amount of greenhouse gas emissions that were produced through the life of the project. With the advent of LCA tools, design professionals can determine the most applicable materials when modeling the entire project life cycle, i.e., raw material extraction, manufacturing, installation, operational & maintenance, repair and end-of-life decisions. Only when considering a project's entire life (60, 75 or 100 years) is when true environmental impacts can be evaluated. Holistic project LCA provides opportunities to compare alternative designs and/or materials for selecting the optimal path to meet both environmental and performance objectives. EPDs are still important because the quantified environmental impacts found in an EPD can then be used to help calculate the entire LCA for a project, whether it's a building or infrastructure project.

Use industry-average benchmarks to establish a baseline and use industry-wide environmental product declarations to establish a carbon budget. It is still necessary to have a general idea of what the carbon footprint of each mix will be to set a carbon budget for the building. By setting a carbon budget for all the concrete, it provides enough flexibility to the contractor and concrete producer to meet the all the performance criteria, such as strength and durability, while also meeting carbon reduction goals.

Specifications can require that product suppliers submit Life Cycle Inventory (LCI) data for their products or Environmental Product Declarations (EPDs) to help the design team conduct a Whole Building LCA. There are several LCA tools in the market including Tally and Athena's Impact Estimator.

Specification language options:

- Option 1
  Supply concrete mixtures such that the total Global Warming Potential (GWP) of all concrete on the project is less than or equal to 4,298,000 kg of CO_2 equivalents as calculated using the Athena Impact Estimator for Buildings Software available at www.athenasmi.org.
- Option 2
  Supply concrete mixtures such that the total Global Warming Potential (GWP) of all concrete on the project is 30% or more below the GWP of a reference building using stipulated benchmark mixes. Submit a summary report of all the concrete mixtures, their quantities and their GWP to demonstrate that the total GWP of the building is 30% or more below the GWP of the reference building. Contractor may use the Athena Impact Estimator for Buildings software available at www.athenasmi.org or other similar software with the capability of calculating GWP of different mix designs.

MRMCA Reasons to Oppose HB0261 and SB0424 2-17-202

Uploaded by: Thomas Evans

Position: UNF

Maryland Ready Mix Concrete Association (MRMCA) comments regarding HB0261 and SB0424 Public Projects - Global Warming Potential of Materials (Buy Clean Maryland Act) and additional resources for written testimony opposing the Bills:
2-17-2023

GENERAL POSITION STATEMENT - The Maryland cement and concrete industry welcomes the conversation and wants to meet with you to discuss this Bill and other legislation that aims to lower the carbon footprint of construction materials. Local concrete producers are at the forefront of innovation and technology to optimize concrete mixtures for the betterment of all Marylanders. The Maryland Ready Mix Concrete Association (MRMCA) agrees with the intent of the legislature to curb greenhouse gas (GHG) emissions of our public infrastructure projects. However, green building initiatives need to focus on more than one aspect beyond simply embodied carbon. The most effective strategy for ensuring a sustainable, built community is to consider the full life cycle of the project.
All aspects of sustainability including resilience, energy usage, operating costs, safety, water, biodiversity, and the quality of life should be considered when planning / designing the built environment. (See attached document given to the Maryland Dept. of General Services in September of 2022.)

EMBODIED CARBON EMISSIONS - MAXIMUM ACCEPTABLE GLOBAL WARMING POTENTIAL - ELIGIBLE MATERIALS - EPDs
This Buy Clean Maryland Bill initiative emphasizes reducing a material's Global Warming Potential (GWP) impact by identifying embodied carbon emissions in "**eligible materials**". However, this Bill only identifies "**cement or concrete mixture**" as "eligible material".

Only addressing cement and concrete in the legislation is short-sighted. Without addressing carbon footprint reduction of all building materials and more importantly, their use, maintenance, and ultimate replacement, the legislature's effort to reduce carbon footprint misses large opportunities to make the built environment more sustainable. The limited application of this mandate to only certain building materials, placing a burden on some manufacturers and not others, is government picking winners and losers and will only increase cost to taxpayers.

IMPACTS OF ARBITRARY LIMITS ON HOW AN INDUSTRY MANUFACTURES ITS PRODUCTS
This proposed law appears to have no consideration of the impact of this rule on public safety, serviceability, and service life of concrete structures and other applications. Industry ingenuity and **innovation** has and will continue to move towards green construction as it aligns with the industry's internal financial incentives.

Additional Impacts:
- **Fast track construction** of high-rise **buildings** and **transportation projects** – roads, airport runways, bridges, may be severely constrained and can cause **significant traffic congestion** while increasing construction costs. Traffic management and user costs might increase as a result.
- Project **construction schedules** for moving formwork and opening to service loads or involving post-tensioned concrete may be delayed or additional resources could be required, thereby **increasing the cost of construction**.

ELIGIBLE PROJECT and Section 3-602 OF THIS ARTICLE:
- The selection of which materials are used in buildings occurs **during the DESIGN process**, which is **not typically controlled during the PROCUREMENT process**.
- In the case of concrete, **EPDs usually only list one performance metric:** 28-day strength. Since concrete mixes are created to meet numerous performance metrics—exposure, cure time, stiffness, density, constructability, etc.—it is inappropriate to compare them purely based on strength.
- The main determinant for GWP reduction is SCHEDULE. At the project bidding stage, the schedule for a project is not yet established. For concrete projects, the **optimization of all the mix designs with the schedule** (i.e., when to pull forms) is the **key to achieve carbon reduction goals**. The most sustainable
  design decisions using **whole building life cycle assessments** (LCAs) that include impacts from materials production, construction, operation, end-of-life **should be used by architects and engineers.**

Additional comments:
- Any numbers or limits established for a material should be based on **real data from local suppliers**.
- This Bill is focusing solely on CO2 and not on the **broader issues of sustainability**.
- Need to consider CO2 emissions for **operation, maintenance, and the longevity** of the structure.
- If limits are set for concrete, the whole structure should have a maximum not a category maximum. Some high strength mixes in critical areas may **lower the total emissions** of the structure.
- **Incentivize additional environmental performance**. There is currently no benefit to exceeding the minimum standard.
- This Bill only pertains to certain "**public**" projects (read public funds used for construction) and apparently does not affect **private sector projects** at this time.
- How does this Bill tie into the **Climate Solutions Now Act of 2022**?
- There are several "waivers or escapes" from the legislation mentioned in 4-904(E), that are not well defined.
- All industries, agencies, and associations involved with the construction of "public" projects will be impacted by this Bill and those industry organizations should **oppose this Bill** or at least **request amendments**.

'23 SB 424 Concrete DGS LOI B&T 2-22-23.pdf
Uploaded by: Ellen Robertson
Position: INFO

BILL: **Senate Bill 424**
Public Projects – Global Warming Potential of Materials

COMMITTEE: Senate Budget and Taxation

DATE: February 22, 2023

POSITION: Letter of Information

Upon review of Senate Bill 424 – Public Projects – Global Warming Potential of Materials (Buy Clean Maryland Act), the Department of General Services and the Maryland Green Building Council (MGBC), provides these comments for your consideration.

This bill utilizes Global Warming Potential (GWP), a measurement of a product's impact on climate temperature to create a maximum limit of acceptable greenhouse gas emissions for a material or product. GWP is the measure of the total energy that a gas absorbs over a period of time (typically 100 years), compared to carbon dioxide (which has a GWP measurement of 1). As defined in the bill an "eligible material" is any form of cement or concrete mix used in an eligible product would be subject to the bill's provisions. The bill requires DGS to establish the maximum GWP limit. Due to the highly technical nature, DGS would procure a consultant to assist with the research and development of this set of GWP limits based upon industry averages as the bill requires. Once limits have been established, DGS will need to ensure all projects falling under the scope of this bill include concrete and cement products that meet those established limits.

Environmental Product Declarations (EPDs) are like "nutrition labels" for products created by a manufacturer that provide disclosure of the carbon impact of a product. To verify compliance with GWP limits, DGS would require the submission of product-specific EPDs and would then need to verify that products fall within the established thresholds. The measurement of the climate impact of concrete could be accomplished through a coordinated approach on State of Maryland design and construction projects through EPD standards established by the Maryland Green Building Council's (MGBC) High-Performance Green Building Program. Compliance verification during each state entity's procurement, quality assurance program and construction submittals, testing and inspection phases would also be performed. Such an approach would require compliant EPDs to be submitted and verified for each project. It would require an additional staff or the use of a consultant to assist with each project's review process.

Per Chapter 38, 2022 Maryland Laws (Senate Bill 528), effective June 1, 2022, the **MGBC examined the use of EPDs to measure the climate impact of concrete** and compiled its **findings in a report linked HERE.** There are several recommendations made in the report that may make the legislation less burdensome on vendors, including the inclusion of financial incentives for vendors to obtain EPDs for their products.

The MGBC supports the intent of the legislation, to decrease greenhouse gas emissions and their impact on the atmosphere. We respectfully request consideration of the following amendments to this bill.

Apply the bill's provisions to the High Performance Green Building Program, State Finance and Procurement Article § 3-602.1.

Create a new section under State Finance and Procurement Article § 4-903 stating the Green Purchasing Committee (within DGS) has a year to assess EPD data for GWP limits:

- Page 2, line 21 insert "**(A) BY DECEMBER 31, 2025, ENVIRONMENTAL PRODUCT DECLARATIONS SHALL BE SUBMITTED TO THE DEPARTMENT TO ASSESS GLOBAL WARMING POTENTIAL FOR ELIGIBLE MATERIALS USED IN AN ELIGIBLE PROJECT IN ACCORDANCE WITH THIS SECTION.**"

To include a 1 year period of "disclosure" - require EPDs to be submitted prior to setting a mandatory limit, which will give the Green Purchasing Committee (within DGS) the time to collect data before setting the mandatory limit. This changes the date to establish a GWP limit to 2026 so the Green Purchasing Committee can collect EPD data for a year:

- Page 2, line 21 strike "~~2025~~" insert "**2026**"
- Page 2, line 21 strike "~~(A)~~" insert "**(B)**"

For additional information, contact Ellen Robertson at 410-260-2908