HB0363 – Clean and Renewable Energy Standard (CARES)

House Economic Matters Committee Hearing, February 28th, 2020

Unfavorable

Chairman Davis, Vice Chair Dumais, and Honorable Members of the Economic Matters Committee,

My name is Rianna Eckel, I am the Senior Maryland Organizer with Food & Water Watch. On behalf of the twelve undersigned organizations and our thousands of members in Maryland, I urge an unfavorable report on SB265, the Clean and Renewable Energy Standard (CARES) Act. Despite its name, CARES would increase the state's reliance on polluting, dangerous energy sources such as nuclear energy and fracked gas. Instead, Maryland must prioritize moving to truly clean, renewable energy for the health of our communities and climate.

If passed, CARES would allow new nuclear reactors, including small modular reactors, to qualify for Clean Energy Resource Credits and would also use the energy output from existing nuclear reactors to decrease the goals of the Clean and Renewable Energy Standard. These provisions would offset the development of real clean, renewable energy.

Experts have shown new nuclear reactors now cost three to four times more than onshore wind and utility-scale solar, and planning and building these reactors takes at least ten years. On top of the exorbitant costs and long construction times, over the last fifty years, more than half of all reactors planned in the US were cancelled. Small modular reactors, hailed as a cheaper and faster way to get nuclear power on line, are not available now and are many years away from approval and implementation.

Today, Calvert Cliffs produces 25 percent of the energy consumed in Maryland. The Peach Bottom reactor just over the Maryland line in Pennsylvania produces even more. Combined, the two produce over 60 percent of the energy Maryland consumes. Factoring their output would do nothing short of destroying our renewable energy goals.

Aside from the problematic economic risks, nuclear energy also produces radioactive waste that is extremely difficult to dispose of. Subsidizing and incentivizing nuclear power would be propping up an uneconomic, dangerous industry. This money would be far better spent on investments in wind, solar, and energy efficiency.

In the CARES legislation, fracked gas is also hailed as clean energy. Maryland banned fracking for a reason - fracking is never clean, even if accompanied by carbon capture and sequestration. It devastates frontline

communities and pollutes our air, water, and climate. Methane leaks are also highly prevalent from extraction and transportation of fracked gas, fueling climate chaos.

While including the removal of incineration and black liquor from the list of qualifying energy sources is a good, long-overdue policy, we encourage the committee to pass standalone legislation that would remove these sources, SB560/HB438 and SB168/HB98.

Scientists say that we have 11 years to drastically reduce our emissions and move to truly clean, renewable energy. The provisions suggested in the CARES legislation would dramatically undermine Maryland's climate leadership and would greenwash dirty, polluting energy. We can do better. Let's put our energy and investments towards the grid of the future.

We recommend an unfavorable report.

Sincerely,

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At What Cost: Why Maryland Can't Afford More Subsidies for Nuclear Power

When we subsidize the nuclear industry, we are left with aging facilities and nuclear waste we have no way to dispose of. When we invest in new renewable energy, we are building the energy of our future.

Nuclear power has relied on government subsidies for 60 years. Without billions of dollars in direct and indirect subsidies, and taxpayers on the hook to cover liability in case of an accident, the nuclear industry would not exist.

When we restructured Maryland's electricity markets twenty years ago, energy generators accepted the risks of competition and have earned substantial profits. As the Calvert Cliffs reactors near retirement, we must responsibly prepare for the inevitable shut down of our existing plants.

Nuclear Power: Costly & Wasteful

Subsidizing nuclear power is counterproductive to our energy goals.

Nuclear power already benefits from a large number of government subsidies. A 2011 report showed that subsidies for nuclear power have often cost taxpayers and consumers more than the value of the electricity that reactors generate. [1]

Every dollar we spend propping up aging reactors is a dollar we can't spend on the inevitable transition away from nuclear power to a clean, safe, and affordable energy economy. Energy efficiency, wind, and solar are all cheaper than continuing to invest in nuclear, and much faster to get online.

A National Trend of New Subsidies

Recently, Exelon has begun collecting new subsidies in several states:

In New York, Exelon is receiving over $540 million per year in subsidies that could cost ratepayers $7.6 billion by 2029--making nuclear power far more expensive than acquiring electricity from wind and solar.

In Illinois, Exelon blocked renewable energy programs until it got $2.5 billion for three reactors in 2016. Now, Exelon is demanding subsidies for eight more reactors.

In New Jersey, Exelon and PSEG are now receiving $300 million per year in subsidies for three already-profitable reactors.

CHESAPEAKE SAFE ENERGY COALITION

[1] Koplow, Doug. "Nuclear Power: Still Not Viable Without Subsidies. Union of Concerned Scientists." February 2011. https://www.ucsusa.org/nuclear-power/cost-nuclear-power/nuclear-power-subsidies-report

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New Reactors: Bad Bets & False Promises

Building nuclear reactors is too expensive, too slow, and too risky to be a viable climate solution.

Too Expensive: New reactors now cost 3-4 times more than onshore wind and utility-scale solar. Over the last ten years, the cost of nuclear has increased by 25%. The costs of wind and solar have decreased by 70% and 89%, respectively.

Too Slow: Planning and building a new nuclear power plant takes at least 10 years. And multi-year delays are common. In the US, completion of Vogtle 3&4 is now slated to take at least 15 years. Completion of the Flamanville and Olkiluoto reactors in Europe is also delayed to 15 years or more.

Too Risky: Building reactors has a high risk of failure. Over the last fifty years, more than half of all reactors planned in the US were cancelled. That failure rate has worsened. Since 2007, plans to build 30 new reactors were announced. All but two have been suspended, cancelled, or abandoned construction.

New Designs, Same Problems: New reactor designs are unlikely to reverse these trends. Small Modular Reactors (SMRs) would require mass-scale, factory production to achieve lower costs. No private parties have lined up to order large numbers. That means that high costs and reliance on government are likely to continue with SMRs, and may get even worse

Other proposed designs ("advanced" reactors) are considered even more speculative, based on decades-old concepts that have not proved to be commercially feasible.

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New Subsidies for Old Reactors: Maryland Deserves a Better Plan

Calvert Cliffs is an aging nuclear power plant, which will eventually need to be shut down. Subsidies would only delay closure--investing in wind, solar, and efficiency, instead, is far more cost-effective.

Old Technology: Currently operating reactors in the US are among the oldest in the world. The average age is 39 years old—and half of reactors are over 40. The reactors at Calvert Cliffs are among the oldest: 44 and 42 years, respectively.

Subsidies Unjustifiable: Subsidizing old reactors has proven expensive. Based on the record in other states, Maryland can expect nuclear subsidies to cost about $1.5 billion by 2030, in addition to the cost of electricity from Calvert Cliffs. Acquiring wind and utility-scale solar would be a surer, economical way to reduce emissions and protect Marylanders' pocketbooks.

Lax Regulation: "Relicensing" of aging reactors is lightly regulated in the US. Reactors receive 20-year license extensions, with no physical inspections or safety tests. By comparison, every ten years, France requires months of physical inspections and safety tests. Under pressure from the industry, the Nuclear Regulatory Commission is proposing to weaken safety inspections and enforcement.

Climate Risks: Reactors were not sited with climate disruption in mind. Yet, relicensing does not require addressing the dire conditions that are emerging, even for coastal sites like Calvert Cliffs.

Water Impacts: Calvert Cliffs withdraws 3 billion gallons from the Chesapeake Bay every day to cool the reactors, heating the water and disrupting the ecology of the Bay.

Nuclear Waste: Calvert Cliffs stores over 1,500 metric tons of high-level radioactive waste. Continued operation adds 30 more tons every year, containing enough plutonium for 50 nuclear warheads, if extracted from the spent fuel. The waste is essentially hazardous forever, posing a variety of safety and ecological risks.

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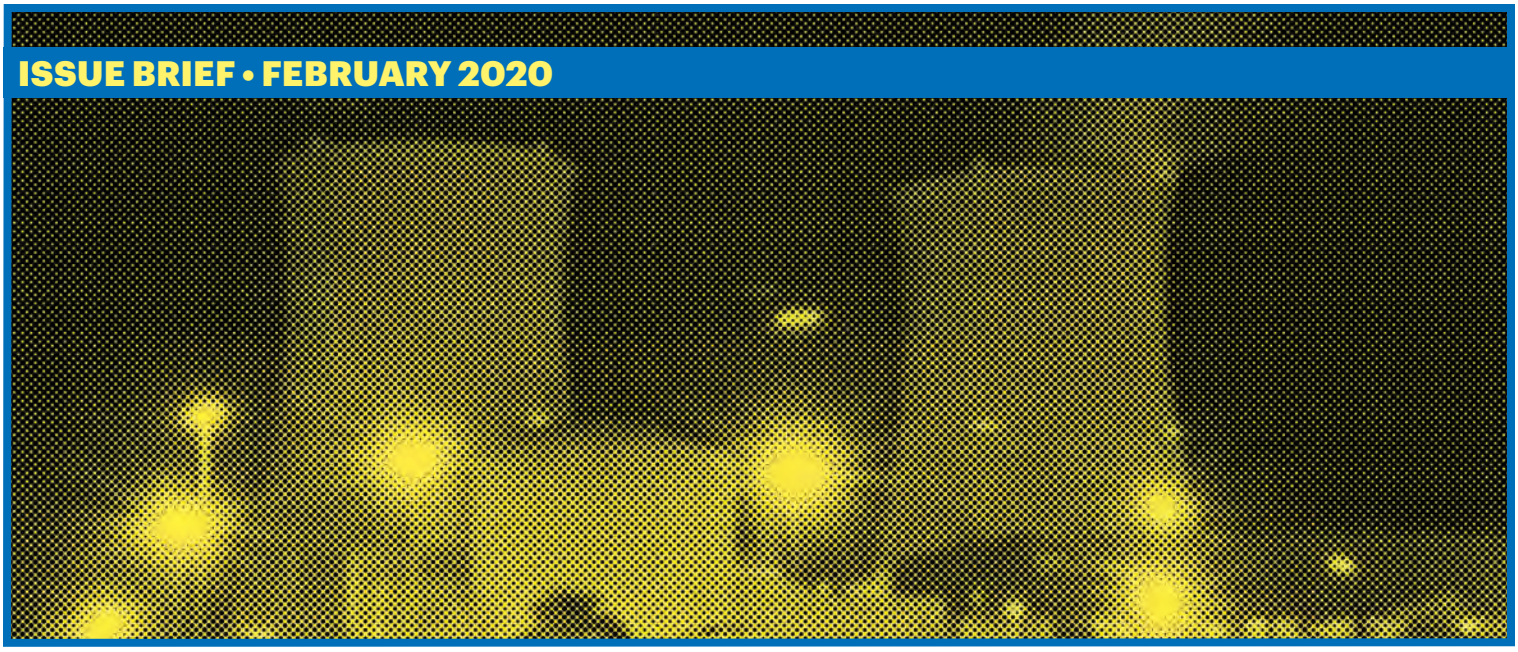
ISSUE BRIEF • FEBRUARY 2020



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Meltdown: The Dangerous Nuclear Option for Climate Control

The climate crisis grows more urgent. Droughts, floods, wildfires, food shortages, extreme weather and other threats to human life sweep the globe.[1] Clear-eyed advocates and policy makers call for the only solutions that will stave off environmental catastrophe: ending the use of fossil fuels, banning fracking and making an immediate and just transition to clean, renewable energy. Others call for timid half-measures like so-called market-based solutions and dirty "renewables" like biogas. Most dangerous of all, though, are those who peddle false solutions to the climate crisis. One such false solution that supporters persistently push hearkens to the last century: nuclear power. Neither clean nor renewable, nuclear power comes at a significant cost to the environment and the public.[2]

Nuclear power is often promoted as a climate solution because it releases fewer climate-destroying emissions during electricity generation than fossil fuels. But across its full life cycle, nuclear is not emissions free.[3] Nuclear plants also require large quantities of water, making the industry vulnerable to climate-related drought conditions and heat waves.[4] Construction is slow and expensive.[5] And radioactive waste poses one of the biggest threats because there are no good disposal options.[6] To stave off the catastrophic impacts of climate change, we must — and can — shift to 100 percent clean, renewable electricity by 2030.

Nuclear Power Plants in the United States

There are currently 59 operational nuclear power plants (97 total reactors) scattered across 30 states.[7] The United States generates more electricity from nuclear plants than any other country, double that of second-place France.[8] In 2018, U.S. nuclear power

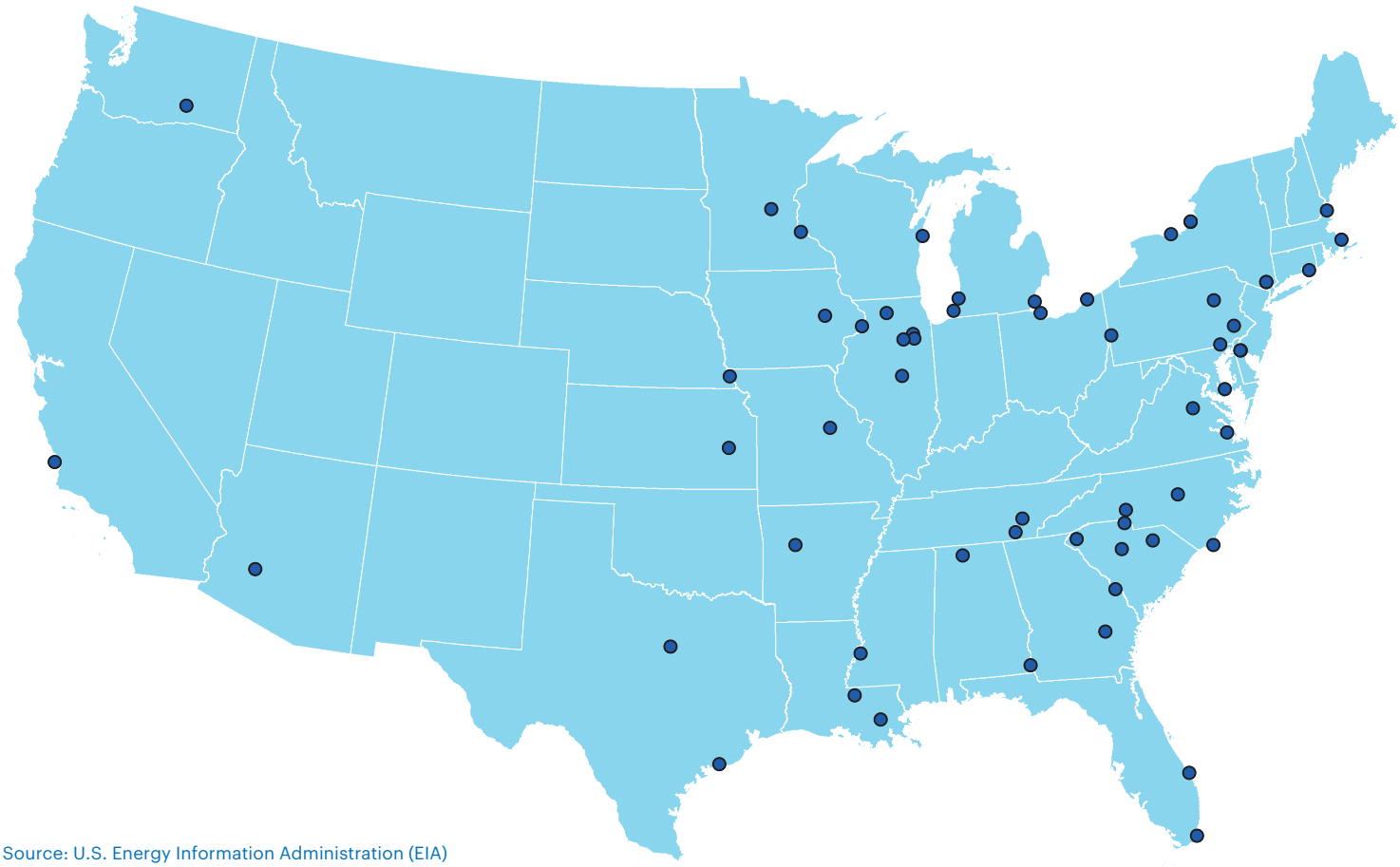
plants generated more than 800 billion kilowatt-hours of energy — 20 percent of the country's electricity; nuclear power ranks third as an energy producer in the United States, behind natural gas and coal.[9]

As of July 2019, seven nuclear power plants (nine reactors) had announced plans to retire after struggling to compete with cheaper energy sources. One of these — the notorious Three Mile Island facility in Pennsylvania — has since retired.[10] Despite economic challenges, some plants (like Davis-Besse and Perry in Ohio) were rescued by taxpayer-funded state subsidies.[11] Two new reactors are under construction in Georgia and are projected to begin operating in 2021 and 2022.[12]

The current fleet of nuclear plants is aging and plagued by crumbling infrastructure. Roughly half of the nuclear reactors in the country have been operating since before the 1980s and longer than the 40 years the Nuclear Regulatory Commission (NRC) originally licensed reactors to operate.[13] Many of the plants are outrageously operating on 20-year extensions, and the NRC has started authorizing renewals that allow reactors to operate for 80 years — double the time frame that some of the structures were built to last.[14] The NRC dismisses aging issues and claims that safeguards are in place to ensure that facilities can safely operate for the extended periods.[15] Evidence suggests otherwise.

Analyses by the NRC's own researchers concluded that nuclear power plants are susceptible to cracks and corrosion; aging could become a problem for those operating on extended licenses.[16] In 2009, just one week after New Jersey's Oyster Creek nuclear plant was granted a 20-year operating extension, leaks from the plant's aging pipes were discovered in and around the facility.[17] While Oyster Creek is no longer operating,[18] other nuclear power plants continue to put the public and environment at risk under the false narrative that these plants provide clean, renewable energy.

Figure 1: Nuclear Power Plants in the United States[21]



Source: U.S. Energy Information Administration (EIA)

Historically, undesirable facilities are placed in communities that are already socially and economically disadvantaged because they have less political power; expanding nuclear power will only exacerbate such injustices. Nuclear power plants are frequently located in lower-income communities and communities of color, and larger proportions of African Americans live within the emergency planning zones than outside.[19] From the 1950s to the 1980s, uranium mining occurred mostly on indigenous lands, disproportionately exposing indigenous peoples to toxic pollution.[20]

Nuclear Power Is Not Clean, Renewable or Safe

Supporters of nuclear energy have promoted its expansion as an opportunity to tackle the climate crisis, reduce air pollution and decrease our reliance on fossil fuels.[22] But nuclear is not a solution. Proponents must not ignore emissions from the broader life cycle, the many health impacts associated with the radioactivity, the vulnerability that nuclear power plants face in an already changing climate, and the problems associated with the continued dependence on uranium.

Greenhouse Gas Emissions

Nuclear power is frequently mischaracterized as carbon free, but these claims focus solely on direct emissions from electricity generation and leave out the climate-destroying emissions associated with the full life cycle of nuclear.[23] A fuller and more accurate accounting, which includes key components of the nuclear life cycle such as mining, milling and enriching uranium to produce nuclear fuel, as well as power plant construction, reveals that the nuclear energy sector is carbon intensive. In some cases, the nuclear life cycle emits as much carbon dioxide per kilowatt-hour as natural gas plants to meet those demands.[24]

Several lifecycle studies found that while nuclear may produce fewer greenhouse gases per unit of energy than fossil fuels, emissions are significantly higher than from wind and solar power.[25] Wind energy, for example, produces 7 to 25 times less carbon dioxide pollution compared to nuclear.[26] Despite nuclear's carbon footprint, several states have incorporated nuclear power into their clean energy or renewable energy standards.[27]

Public Health Threats

One of the most common concerns about nuclear power is the threat of a nuclear accident or reactor meltdown. Disasters at the Fukushima Daiichi (Japan, 2011) and Chernobyl (Ukraine, 1986) nuclear power plants resulted in major releases of radioactive material, fatalities among first responders, mass evacuations, long-term abandonment of areas around the disasters and increased incidence of acute radiation syndrome, cancer and mental health impacts.[28] Children and the elderly are particularly vulnerable: the risk of thyroid cancer increased significantly in children after Chernobyl, and death rates among the elderly tripled in the three months following Fukushima due to stressors from relocation.[29]

The Three Mile Island meltdown (Pennsylvania, 1979) led to the evacuation of 195,000 people after serious damage to the reactor. Fortunately, health effects from the radioactive release were found to be negligible.[30] Based on a global analysis of incidents at nuclear power plants, uranium-related sites and storage sites for radioactive waste, scientists have predicted "a 50 percent probability of a Fukushima-like event (or more costly) every 60-150 years, and a Three Mile Island event (or more costly) every 10-20 years."[31]

Nuclear energy also poses occupational health risks to workers. Prolonged exposure to low levels of radiation, such as that faced by workers in nuclear power plants, can increase the risk of death from leukemia.[32] Mining and milling uranium has been linked to a number of health problems. Exposure to radon from uranium mining increases the risk of lung cancer: lung cancer deaths in miners have been observed at rates five times greater than in the general population.[33]

Compounding the public health burdens, these risks come with significant economic costs. As of 2011, more than 7,000 uranium-related workers received $713 million from the U.S. government for associated health impacts such as lung cancer and silicosis.[34]

Cleanup costs after nuclear disasters are also astronomical. The Fukushima disaster is estimated to cost Japan $460 billion to $640 billion.[35]

Water

The relationship between nuclear power plants and water complicates the heralding of the sector as a solution to climate change. Not only does nuclear power threaten water supplies, but the operation of plants is highly vulnerable to a changing climate.[36] Nuclear power plants withdraw and consume significant amounts of water to produce electricity with steam engines and to cool process water. For every megawatt-hour of electricity produced, nuclear plants on average consume roughly 750 gallons of water, whereas solar and wind generation use on average 125 gallons and less than 1 gallon, respectively.[37] Nuclear is consistently among the energy sources that require the most water, in some cases using more water than fossil fuels.[38]

Heavy reliance on water makes nuclear power plants vulnerable to a changing climate where extreme weather events are more prevalent. Droughts, water shortages and increasing water temperatures can reduce electricity generation at facilities or cause temporary shutdowns.[39] For example, Brown's Ferry Nuclear Plant in Alabama shut down temporarily in response to a drought in 2007.[40] High water and air temperatures force plants to reduce electricity output, especially in the summer when demand is highest, making them an unreliable energy source.[41]

Nuclear power plants also release heat into aquatic environments. Water is used in nuclear plants to condense the steam needed for electricity generation; it is warmed during the process, then typically discharged back into rivers, lakes and oceans.[42] This thermal pollution harms ecosystems.[43] Thermal pollution from power plants can lead to declining fish populations and promote algal blooms that produce harmful toxins.[44]

Climate change and warmer waters have pushed nuclear power plants to reduce their output with greater frequency to comply with temperature limits for receiving waters and limit damage to the environment.[45] But limits on how warm the water can be before being used as cooling water within the plant also restrict operations at nuclear plants. One unit at Millstone Power Station, which provides Connecticut with half of its electricity, was forced to shut down for almost two weeks in 2012 when temperatures in Long Island Sound were too high.[46]

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Finally, water contamination is a reality surrounding nuclear power. An *Associated Press* investigation found that 74 percent of nuclear power plants had leaked radioactive tritium into ground water from aging pipes.[47] While most leaks remained within the facility boundaries, some migrated offsite and contaminated private drinking wells.[48] Officials have said that the levels of tritium posed no health threat, but the presence of tritium can often indicate that other more powerful radioactive isotopes may have leaked as well.[49] Uranium mining also threatens water supplies when they become contaminated with uranium during extraction and flooding.[50]

Uranium

A major factor for "renewable" energy sources is the expectation that the resource should not deplete. Fossil fuels such as natural gas and coal are finite resources. Alternatively, the sun will continue to shine and the wind will continue to blow, regardless of how much of this energy is harnessed by solar panels and wind turbines. Nuclear power plants depend on uranium which, like fossil fuels, will run out with use.

Given the size of uranium reserves and the current rate of uranium mining and use, research suggests that just 127 years' worth of uranium remains.[51]

Expanding the nuclear power fleet would deplete this limited resource sooner. While alternative sources and technologies exist to delay depleting uranium reserves, they do not eliminate the risk of nuclear weapons proliferation (see advanced nuclear box on page 6).[52]

Mining and enriching uranium also fails to meet the criteria for a clean energy source. For one, extraction, which includes open-pit mining, can contaminate water and emit naturally occurring radon and methane from underground into the air.[53] After uranium is mined and processed, it must be enriched before being used in a nuclear reactor; enrichment is the process that removes impurities from the mined natural uranium and increases the concentration of the uranium-235 to a level needed to fuel nuclear reactors.[54]

Uranium-contaminated wastewater has polluted environments around mines, including aquifers and springs near the Grand Canyon.[55] Spills of uranium tailings (toxic and radioactive waste produced as uranium ore is processed and enriched) and uranium hexafluoride (the form of uranium used during enrichment) around the mines have released harmful pollutants comparable to those at the Three Mile Island incident.[56] A massive spill in 1979, for example, released more than 90 million gallons of radioactive wastewater and 1,100 tons of uranium waste in New Mexico, devasting Navajo lands and contaminating drinking water. Decades later, nearby residents still face widespread contamination due to inadequate cleanup and remediation.[57]

Nuclear's Radioactive Waste Problem

Radioactive waste is produced throughout the nuclear power cycle. This waste includes mine and mill tailings, spent fuel rods (which contain used nuclear fuel in slender tubes that provided fuel to the nuclear reactors) and waste produced when decommissioning plants.[58] Fuel rods used in reactors generate electricity for up to 18 months before becoming "spent" nuclear waste.[59] Spent fuel is highly radioactive and remains so for thousands of years.[60] Spent fuel can quickly emit lethal amounts of radiation, making safe storage and disposal a critical challenge.[61]

The global consensus for safe, long-term disposal has been to store high-level radioactive waste such as spent fuel rods deep underground in geologic repositories, but the United States has yet to establish such a storage site.[62] Despite the absence of a safe and acceptable storage facility, nuclear power plants continue to operate.

As of 2018, spent fuel from nuclear power plants totaled over 250,000 metric tons of heavy metals like uranium and plutonium globally.[63] In the United States, approximately 2,000 metric tons of radioactive waste is produced annually — as of 2017, roughly 80,000 metric tons of waste had been generated and was being stored with short-term measures at 75 reactor sites across more than 30 states.[64] The short-term measures used to store nuclear waste include spent fuel pools and dry cask storage. Roughly three-quarters of spent fuel is stored in pools never meant for long-term storage.[65] The pools are designed to cool spent fuel rods, prevent overheating, and protect workers and the public from radiation before being transferred to dry casks and a long-term geologic repository.[66]

Because no permanent repository exists, the pools contain spent fuel rods at a higher density than originally intended and hold more than five times more radioactivity than nuclear reactor cores, but they lack the same level of containment and protection as reactors.[67] Water loss in the pools can lead to dangerous radiation levels in the surrounding area or allow the fuel assemblies to overheat, catch fire and explode, as was the case during the Fukushima Daiichi disaster.[68] The lack of adequate structural protection and reliance on maintaining water levels makes spent fuel pools particularly vulnerable to natural disasters or terrorist attacks that could cause the pools to lose water and lead to devastating environmental and public health impacts.[69]

Like spent fuel pools, dry casks are mostly stored onsite and are designed for temporary storage, but they are generally considered a safer option that is less susceptible to mechanistic failures (for example, water loss) or threats.[70] While safer, dry casks can only accommodate older spent fuel that has already been cooled in pools.[71] Still, just 25 percent of nuclear

waste is stored in dry casks, and spent fuel that is older than five years could be transferred from pools to dry casks at an estimated $3 billion to $7 billion over 10 years.[72]

Private companies such as Holtec International are seeking approvals to build interim storage facilities to collect spent fuel from commercial nuclear power plants around the country, despite the risk of transporting waste across the country and opposition from nearby communities, governments, and agriculture, oil and gas industries.[73] Even still, with licensing reviews and environmental impact studies, it would be years before these companies could start accepting waste.[74] Deep Isolation Inc. has proposed using horizontal drilling methods, such as those used for unconventional oil and gas extraction and fracking, to inject and bury nuclear waste deep underground in horizontal drillholes.[75]

While regulators, legislators, utilities and private companies mull over how to best handle the highly radioactive waste, nuclear power plants continue to add to the problem and put nearby communities at increasing risk. Without a good solution to safely reduce and dispose of the waste, these plants cannot be allowed to operate under business-as-usual.

Nuclear Energy Economics

Beyond the fact that nuclear energy is neither carbon free nor clean, it is also expensive and uneconomical. Cheap natural gas has already undercut the competitiveness of nuclear power, and renewables such as wind and utility-scale solar are already cheaper than nuclear power.[84]

Per kilowatt-hour, new nuclear power plants cost 2.3 to 7.4 times more than onshore wind or utility-scale solar.[85] Fixed construction and technology costs typically decrease over time, but the cost of constructing nuclear plants has risen steadily since the 1960s.[86] Just in the last decade, the unsubsidized levelized costs for nuclear power increased by 26 percent, while

Advanced Nuclear Is Not the Silver Bullet

The challenges facing nuclear energy expansion and radioactive waste disposal have built a movement around "advanced" nuclear energy (i.e., the development of new or next-generation nuclear technologies). Proponents of nuclear argue that advanced nuclear will save the planet by reducing emissions, construction time and the cost of nuclear power plants,[76] but these technologies are a false solution.

First, nuclear energy is not emissions free (see page 3). Second, advanced nuclear is expensive. With technologies still under development, advanced nuclear needs to be propped up by research subsidies that could be better spent on building out true, clean renewables. Even the industry's leading association, the Nuclear Energy Institute, admits that "the government has to have more skin in the game" for advanced reactors to take off because of the high costs.[77] The industry needs governments to make purchasing agreements,[78] which would inherently undermine agreements for clean, renewable energy. Small modular reactors manufactured in factories before being assembled onsite are often peddled as a solution to the high capital costs, but they are likely to have higher operational costs compared to traditional reactors.[79]

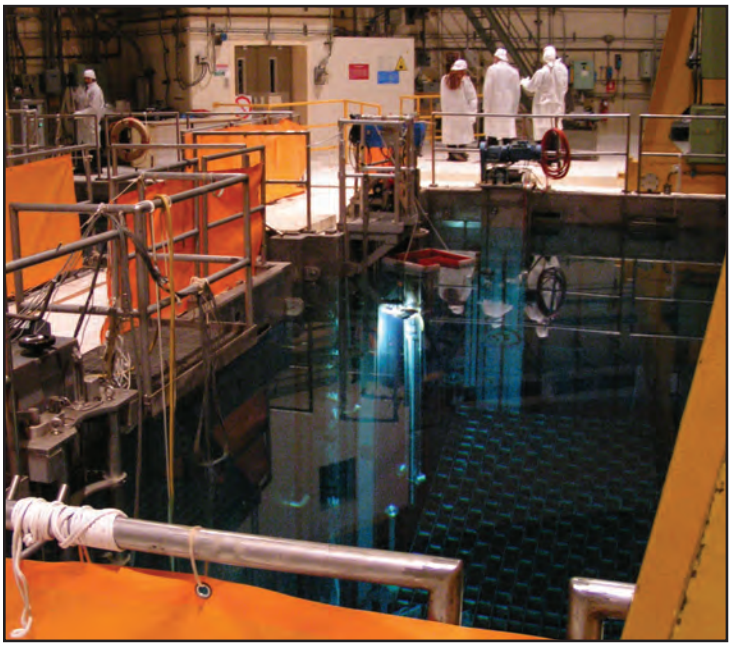
Third, advanced nuclear faces similar resource and waste challenges as traditional reactors.[80] TerraPower seeks to develop a nuclear reactor that produces 80 percent less nuclear waste, but there are no set plans to build such a reactor and it would at most be a 500 megawatt reactor built no sooner than 2025.[81] New reactor designs, such as breeder and fast reactors, can produce less waste, but this increases the risk of nuclear weapons proliferation as it produces more plutonium used to make nuclear bombs.[82] Even still, the new designs do not eliminate waste entirely, and there is no waste disposal solution.

Moreover, because the technologies are still under development, frequently delayed and years away from deployment,[83] they cannot be expected to solve the climate crisis, which requires us to transition to clean renewables by 2030.

utility-scale solar and wind energy costs declined by 89 percent and 70 percent, respectively.[87] Battery storage costs have also dropped 84 percent in the last decade and are expected to continue falling.[88]

Operating costs exceed revenue in more than a quarter of the country's nuclear reactors, while low profitability and high capital costs make constructing nuclear power plants and reactors challenging and less favorable to investors.[89] Compared to other sources of electricity generation, nuclear power is economically riskier.[90] Construction costs at the two most recent projects in the United States — two reactors each at the Vogtle plant in Georgia and the V.C. Summer plant in South Carolina — are more than double initial estimates, which eventually ended the V.C. Summer project.[91] Vogtle, still under construction, was originally estimated to cost $14 billion, but estimates increased to $29 billion in 2017.[92]

Waste disposal is also costly. To construct just one permanent geological repository could cost billions.[93] The United States spends roughly $500 million a year storing radioactive waste from nuclear power plants; this is expected to increase as the inventory grows.[94] As plants retire and revenues stall, covering the cost of storage for hundreds of thousands of years becomes even more challenging.



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Spent fuel is meant to be cooled and stored temporarily in pools (see above), but a lack of long-term disposal options have left spent fuel pools overcrowded.

Taxpayers Subsidize Nuclear Power

High costs have forced the nuclear power industry to rely heavily on government subsidies, including insurance subsidies, loan guarantees and direct payments like zero-emission credits.[95] Insurance subsidies ensure that the government — taxpayers — will cover the cost of a nuclear accident beyond a set "cap," because insurance companies refuse to fully cover nuclear power plant liabilities.[96] Loan guarantees, such as the $8.3 billion authorized by the Obama administration for Southern Co.'s new Vogtle reactors, help limit the economic risk of expanding nuclear power.[97] Building a new fleet of nuclear power plants would require an estimated $500 billion in federal loan guarantees.[98] A global study found that if nuclear plants relied solely on private investments there would be an average of $5 billion in losses for each plant.[99]

Low natural gas prices have also contributed to small profit margins at nuclear power plants. Subsequently, several companies have threatened early retirement without financial support or incentives to continue operating, such as extra payments for producing "zero-emission" electricity or access to more favorable renewable energy markets where nuclear plants would not compete with natural gas.[100] The Trump administration's Department of Energy has stated that the federal government does not have the authority to provide economic support for nuclear power plants and that they should instead look to state governments for support.[101]

In the last several years, many states have made moves to bail out nuclear power companies at the ratepayer's expense (see Table 1 on page 8). The bailouts generally involve commitments to purchase electricity from nuclear plants as a zero-emissions or carbon-free source in an effort to save jobs and meet clean energy targets, which undermines the expansion of real clean, renewable energy such as wind and solar. Companies have secured hundreds of millions of dollars a year, amounting to billions over the length of some contracts, after lobbying campaigns that cost just a few million dollars.

In New Jersey, PSEG Power and Exelon spent a combined $2.6 million in lobbying efforts in 2017

and secured close to $300 million a year for two nuclear power plants that are still profitable.[102] In 2018, FirstEnergy Solutions spent $2.7 million in Ohio on lobbying and public relations firms to pass Ohio House Bill 6.[103] Millions more were spent by FirstEnergy and dark-money political groups on campaign contributions and advertising to pass the bill, which secures $1.1 billion in subsidies over six years, rescues Ohio's nuclear power plants and weakens the state's clean energy program.[104]

Federal and state subsidies should instead be directed to genuinely clean, renewable energy sources like wind and solar. Studies have shown that, given the high subsidies that nuclear power plants depend on, it is more economical to replace them with clean energy and energy efficiency upgrades.[111] In New York, continuing to support nuclear with handouts from taxpayers through 2050 could cost the state over $32 billion; replacing the plants with wind generation could save $7.9 billion.[112]

Regulatory Influence

The nuclear energy industry also has important sway on the regulatory front. Take, for example, the U.S. Nuclear Regulatory Commission, an independent agency tasked with regulating the "civilian use of radioactive materials," including nuclear power plants, to ensure safety and protect public health and the environment.[113] Like other regulatory agencies, the NRC is compromised by the lobbyist / policymaker revolving door and is influenced by pressure from the industry it regulates. Annie Caputo, for example, is a former nuclear energy lobbyist and one of the five NRC commissioners.[114]

The NRC has also allowed the leading nuclear trade association, the Nuclear Energy Institute (NEI), to help shape and contribute to its regulatory guides, and has even delayed emergency shutdowns to avoid hurting a facility's revenues, despite concerns about corrosion on that facility's reactor.[115] (This facility, Davis-Besse Nuclear Power Station, is the same facility

TABLE 1 • State-Level Nuclear Power Plant Bailouts

State	Nuclear Power Plants	Value of Subsidy	Status	Notes
Connecticut[105]	Millstone	10-year energy purchasing contract	Approved, Sept. 2019	The energy price for the purchase agreement had not been made public as of September 2019. Millstone is still profitable.
Illinois[106]	Clinton, Quad Cities	$2.4 billion over 10 years/ $235 million per year	Passed, Dec. 2016	Exelon, the operator, is seeking additional support for four nuclear power plants that did not receive support from the 2016 deal. All of the plants are still profitable.
New Jersey[107]	Hope Creek, Salem	$280 million per year for three years	Passed, May 2018	The Hope Creek and Salem nuclear plants were profitable at the time the subsidy was approved. The agreement is to be reassessed after three years.
New York[108]	FitzPatrick, Ginna, Nine Mile Point	$7.6 billion over 12 years	Passed, Aug. 2016	
Ohio[109]	Davis-Besse, Perry	$150 million per year	Passed, July 2019	In addition to the nuclear power plant bailout, Ohio House Bill 6 (HB6) also provides subsidies for two coal-fired power plants and weakens standards for energy efficiency programs and renewables.
Pennsylvania[110]	Three Mile Island, Beaver Valley, Limerick, Peach Bottom, Susquehanna	$500 million per year	Died in committee, 2019	Three Mile Island retired in September 2019. Beaver Valley is set to retire by 2021. The remaining nuclear plants are still profitable.

recently rescued by Ohio's nuclear bailout.) The NRC, at the NEI's request, had proposed reducing NRC-led reactor safety inspections and replacing them with industry self-assessments, although the NRC has since walked back the proposal after pushback from the House Energy and Commerce Committee and the House Appropriations Committee.[116]

NEI's political action committee spent nearly $570,000 in 2018 trying to influence the political process surrounding energy issues.[117] The NEI has poured more than $33 million into federal lobbying since 1999.[118] In addition to the trade group, the NRC was lobbied by at least another 24 different entities in 2019, including Contran Corp., a holding company that includes a nuclear waste management subsidiary, and NextEra Energy, a power company that operates nuclear plants.[119]

Conclusion

Nuclear energy harms the environment, threatens public health and fails to address the global climate crisis. The intractable problem of storing highly radioactive waste makes nuclear energy a dangerous and shortsighted option for energy production. Instead, it is time to move forward with cleaner, safer and renewable energy sources like wind and solar. The transition to renewables has grown increasingly more affordable, technically feasible and politically acceptable, while similar factors have idled for nuclear power.[120]

Drastic reductions in carbon emissions are necessary to avoid a global warming increase of 1.5 degrees Celsius as early as 2030 and to curb the devastating climate-related threats that come with it.[121] Proponents of nuclear argue that expanding nuclear power is the only way to fully and rapidly decarbonize the electricity grid and reach climate goals,[122] but we cannot meet this timeline with nuclear. Nuclear power plants take an estimated 10 to 19 years from initial planning, permitting and construction to operation and electricity generation, compared to just 2 to 5 years for utility solar and wind, while producing up to 37 times more emissions per kilowatt-hour than wind energy.[123]

New nuclear power technologies that could be constructed more quickly, cost less or reduce nuclear waste are years to decades away from being commercially available, and still require significant financial investments for development.[124] Meanwhile, technology exists to support a transition to 100 percent clean, renewable energy backed up by storage and transmission at prices lower than current energy costs.[125] At least six states each have the potential to generate as much electricity as all of the country's nuclear power plants from wind energy alone.[126] Redirecting the funds used to prop up nuclear plants to renewable energy can reduce carbon dioxide emissions faster and more efficiently than continuing to source electricity from nuclear power.[127] We cannot invest more time, energy or money into supporting and expanding nuclear power under the false notion that it is a safe and clean energy source, when real solutions exist in wind and solar.

Food & Water Watch recommends:

- Invest in a green energy public works program that fosters a rapid transition to 100 percent clean, renewable and safe energy by 2030.
- Divert federal and state subsidies that prop up nuclear power to investments in clean energy and energy efficiency.
- Halt further bailouts of nuclear power plants.
- Stop state and local permitting of nuclear power plants to sell electricity as renewable energy or on renewable energy markets.
- Demand that the Nuclear Regulatory Commission stop extending licenses on existing nuclear power plants.
- Begin decommissioning nuclear power plants.
- Stop the production of radioactive nuclear waste.
- Fully fund fair and just transition programs for nuclear power plant workers.

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