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Committee: **Education, Energy, and the Environment**
Testimony on: **SB0434 – ENERGIZE Act**
Organization: **Nuclear Information and Resource Service**
Submitting: **Timothy Judson, Executive Director**
Position: **Unfavorable**
Hearing Date: **February 20, 2025**

The ENERGIZE Act would create a process for constructing new commercial nuclear power reactors in Maryland. The mechanism through which it would do so is similar to the process the state has promulgated for offshore wind generation: a procurement and rate-setting process run by the Public Service Commission. The bill includes one provision that would *appear* to mitigate the possibility that the enormous cost overruns that are the norm in nuclear reactor construction from being borne by Maryland residents and businesses. Unfortunately, however, it would still leave Marylanders vulnerable to higher electricity costs resulting from nuclear plant cost escalation. Specifically, the ENERGIZE Act would prevent utility customers from paying nuclear construction costs until the reactor is generating power, but it would not prevent the PSC from raising the approved project cost, as state utility regulators usually have.

There are unique aspects of nuclear power plant projects and the role that politics plays in regulatory oversight and ratemaking which routinely override intended protections set forth in policy. Reactor developers typically provide unrealistically low cost estimates to state regulators in order to win approval to start construction. It is rarely clear whether the submission of inaccurate cost estimates is deliberate or due to error, but if accurate cost estimates were provided to regulators initially, it is likely that utility regulators would not be able to justify giving them the initial green light. Due to the lack of comparable projects by which to evaluate such cost projections, and the high degree of specialization involved in nuclear reactor technologies, it is difficult for regulatory staff to subject nuclear construction budgets to rigorous auditing and, therefore, for Commissions to challenge their accuracy. In short, regulators are forced to take the developers' word for it, setting the stage for repeated deference as construction progresses and cost overruns mount.

The long time it takes to build nuclear reactors also creates the conditions for cost overruns to add up incrementally. Unlike wind, solar, and fossil fuel power plants, which can be built in 2-3 years, construction of nuclear reactors typically takes more than 10 years, longer than most PSC commissioners, governors, or General Assembly members are in office. Changes in interest rates, materials prices, regulations, and other factors can impinge on nuclear construction schedules and costs. Once billions of dollars have been spent and hundreds of construction workers have been employed, it becomes politically controversial to cancel a reactor project, even as costs and delays reach levels not contemplated when the project started. Utility regulators have generally approved incremental cost increases for nuclear reactors rather than make the controversial decision to pull the plug on a high-profile project on which billions of dollars have been spent.

Further, the legislation would not solve other problems that make nuclear energy a bad fit for the goals of the ENERGIZE Act: to reduce greenhouse gas emissions, assure affordable electricity costs, and improve grid reliability. In addition to being substantially more expensive than solar and wind generation (including offshore wind), the long construction times and delays endemic to nuclear reactor construction entail significant climate opportunity costs, by assuring continued greenhouse gas emissions. If the state has authorized construction of reactors under the ENERGIZE Act, then it would be obligated to include generation from them in forward energy planning and to ensure there is a market for their electricity. Many other generation sources and energy systems are substantially cheaper, faster, and more reliable than nuclear power plants, but committing to nuclear energy procurements will preclude their development. In addition, the large cost and high level of complexity of overseeing nuclear projects would tie up the PSC's limited capacity, potentially bogging down reviews of renewable energy, storage, and grid infrastructure projects. By requiring the PSC to administer multiple nuclear tenders and potential reactor applications and construction cost reviews, the ENERGIZE Act could, therefore, have collateral climate and economic opportunity costs.

Marylanders would bear additional, long-term, open-ended risks from new nuclear power plants. No other sources of electricity produce intensely radioactive and extremely long-lived wastes that remain hazardous to human health and the environment for hundreds of thousands of years. There are, as yet, no permanent storage facilities for nuclear waste in the U.S., and no timeframe for which there might be. The U.S. Department of Energy is barred from working on development of a permanent geologic repository since Congress certified the now-failed and -abandoned Yucca Mountain Project in Nevada as the country's first such repository. Any high-level radioactive waste produced by new reactors would be likely to remain in Maryland indefinitely. This and other environmental impacts and opportunity costs of nuclear energy are nowhere recognized in the ENERGIZE Act.

Nuclear power plant construction has suffered from high costs and long construction times since it has been deployed at grid scale. There was a brief period in the 1950s and 1960s when, as a marketing strategy, nuclear engineering firms built a handful of early nuclear power plants for utility companies under fixed-cost contracts, through which the engineering firms accepted all of the financial risks. The actual costs of those projects have never been disclosed. But once Westinghouse, General Electric, Babcock & Wilcox, and Construction Engineering began selling their reactors widely, cost escalation became the norm. Through the first generation of nuclear plant construction, 134 nuclear reactors were built and over 120 were canceled, several of which after substantial amounts of construction.[1] Average construction times escalated to more than 14 years,[2] and final construction costs averaged more than three times original estimates; in some cases, cost overruns approached ten times the original budgets.[3] Due to these trends, utilities

[1] Parker, Larry, and Mark Holt. "Nuclear Power: Outlook for New U.S. Reactors." Congressional Research Service. Updated March 9, 2007. https://sgp.fas.org/crs/misc/RL33442.pdf

[2] Barrientos, Carlos J. "Westinghouse PWR: The Rise and Fall of a Dominant Design in the Electric Power Industry." Massachusetts Institute of Technology. June 2002. https://dspace.mit.edu/bitstream/handle/1721.1/39402/53362716-MIT.pdf

[3] Schlissel, David, and Bruce Biewald. *Nuclear Power Plant Construction Costs*. Synapse Energy Economics. July 2008. https://www.synapse-energy.com/sites/default/files/SynapsePaper.2008-07.0.Nuclear-Plant-Construction-Costs.A0022_0.pdf

stopped building new reactors in 1978, the year *before* the reactor meltdown at Three Mile Island.

Recent experience has been no better. After the U.S. Congress enacted energy legislation in 2005 that provided billions of dollars in direct subsidies and low-cost financing, utilities ordered 28 new reactors between 2006 and 2008. Manufacturers promised that new, pre-certified designs would be affordable and fast to build, taking advantage of advanced engineering, standardized designs, passive safety systems, and other features. At least one design, Westinghouse's AP1000, incorporated a modular construction design, consisting of several factory-produced modules that would be assembled at the reactor site. The Nuclear Regulatory Commission issued construction and operating licenses for 14 new reactors, but utilities eventually suspended or withdrew the other 14 applications.[4]

Construction began on only four reactors, two each in Georgia (Vogtle 3&4) and South Carolina (V.C. Summer 2&3), all using the Westinghouse AP1000 design. Construction started on both projects in 2013, and was supposed to take about 4 years to complete. Cost increases and delays began to mount within the first two years. The cost of the Vogtle 3&4 reactors rose by $1 billion in the first 18 months, and by another $1 billion over the following year to $17 billion.[5] However, costs were mounting even faster behind the scenes. After four years of construction, in 2017, Westinghouse declared bankruptcy due to $8 billion in cost overruns on the Vogtle and Summer projects, and it reported that the costs of each had ballooned from $17 billion to $25 billion. Utilities in South Carolina canceled construction of the Summer reactors, but they had already spent $9 billion on the project.[6] Federal prosecutors indicted two executives from Westinghouse and two executives from SCANA Corporation, the majority owner of the project. All four executives were convicted or pleaded guilty.[7] SCANA was later acquired by Dominion Energy to stave off insolvency.[8]

Utilities in Georgia continued the Vogtle project, and costs continued to rise steadily over the remaining eight years of construction, totaling over $36 billion by the time construction was completed in 2024.[9] The project took a total of 18 years from when planning started in 2006, and 15 years to construct. The Georgia Public Service Commission monitored the project throughout,

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[4] U.S. Nuclear Regulatory Commission. "Combined License Applications for New Reactors." U.S. NRC. Updated July 3, 2023. https://www.nrc.gov/reactors/new-reactors/large-lwr/col.html

[5] Kozeracki, Julie, et al. *Pathways to Commercial Liftoff: Advanced Nuclear*. U.S. Department of Energy. September 2024. https://liftoff.energy.gov/wp-content/uploads/2024/10/LIFTOFF_DOE_Advanced-Nuclear_Updated-2.5.25.pdf

[6] Bade, Gavin. "Santee Cooper, SCANA abandon Summer nuclear plant construction." Utility Dive. July 31, 2017. https://www.utilitydive.com/news/santee-cooper-scana-abandon-summer-nuclear-plant-construction/448262/

[7] Brown, Maggie, and Mary Green. "Final defendant in VC Summer 'fiasco' sentenced to year in prison." WIS News 10. Columbia, SC. November 20, 2024. https://www.wistv.com/2024/11/20/final-defendant-vc-summer-fiasco-sentenced-year-prison/

[8] Crees, Alex. "The failed V.C. Summer nuclear project: A timeline." Choose Energy. Updated December 4, 2020. https://www.chooseenergy.com/news/article/failed-v-c-summer-nuclear-project-timeline/

[9] Durand, Patty, Kim Scott, and Glenn Carroll. "Plant Vogtle: The True Cost of Nuclear Power in the United States." GCV Education Fund. Atlanta, GA. May 2024. https://gcvedfund.org/wp-content/uploads/2024/06/Truth-about-Vogtle-report.pdf

with formal review proceedings every six months. PSC staff testified numerous times that they believed the cost and schedule projections filed by the utility, Georgia Power, were inaccurate.[10] Commissioners approved continuation of the project and expressed confidence in the utility, allowing costs to escalate, despite the Public Service staff's conclusion that the "cost increases and schedule delays have completely eliminated any benefit on a lifecycle cost basis."[11]

Similar trends are already evident among the classes of Small Modular Reactors (SMRs) and "advanced" reactors (non-light-water reactors, or non-LWRs). The total cost of individual SMR and non-LWR projects is likely to be lower because each reactor is much smaller than a 1,000+ MW light water reactor (LWR). But they are not likely to be more cost-effective, because the unit cost of generation is likely to be comparable to or greater than large LWRs. As the Institute for Energy Economics and Financial Analysis (IEEFA) reported last year, the projected costs of SMRs and non-LWRs are already approaching the final cost of the Vogtle 3&4 reactors, before any construction has occurred.[12] When the Vogtle reactors began construction, the project's budget was $14 billion for the two 1,117 MW reactors, or $6.3 million per MW; at completion, the $36 billion total cost amounted to $16.1 million per MW (or more than $20 million/MW in 2023 dollars). IEEFA reports that, before even beginning construction, three leading SMR and non-LWR designs for which cost estimates are available are $21.6 million/MW (NuScale), $18.0 million/MW (X-energy), and $12.3 million/MW (GE Hitachi), all far-exceeding the initial cost projections of Vogtle's AP1000 reactors before construction started. The President and CEO of NextEra, one of the largest utility holding companies in the US, has expressed skepticism of SMRs and concerns about their cost:

> *"They are going to be very expensive and then you're going to be taking a bet on the technology," Ketchum said. "Right now, I look at SMRs as an opportunity to lose money in smaller batches."*[13]

[10] Newsome, Tom, et al. "Direct Testimonies and Exhibits of Tom Newsome, Philip Hayet and Lane Kollen." Georgia Public Service Commission Public Interest Advocacy Staff, Before the Georgia Public Service Commission. January 3, 2023. https://services.psc.ga.gov/api/v1/External/Public/Get/Document/DownloadFile/192559/74336

[11] Newsome, Tom, et al. "In the Matter Of: Georgia Power Company's Twenty-Eighth Semi-Annual Vogtle Construction Monitoring ('VCM') Report—Direct Testimony and Exhibits." Georgia Public Service Commission Public Interest Advocacy Staff, Before the Georgia Public Service Commission. June 22, 2023. https://services.psc.ga.gov/api/v1/External/Public/Get/Document/DownloadFile/204891/86214

[12] Schlissel, David, and Dennis Wamsted. "Small Modular Reactors: Still too expensive, too slow and too risky." Institute for Energy Economics and Financial Analysis. Valley City, OH. May 29, 2024. https://ieefa.org/sites/default/files/2024-05/SMRs%20Still%20Too%20Expensive%20Too%20Slow%20Too%20Risky_May%202024.pdf

[13] Sweeney, Darren. "NextEra CEO sees US climate law catalyzing decades of clean energy growth." *S&P Global – Commodity Insights*. October 3, 2022. https://www.spglobal.com/commodity-insights/en/news-research/latest-news/electric-power/100322-nextera-ceo-sees-us-climate-law-catalyzing-decades-of-clean-energy-growth

Construction timelines are also uncertain. No designs for SMRs and non-LWRs have been fully approved, and none are currently under construction. Three demonstration projects for leading SMR and non-LWR designs were originally targeted for completion in 2026, but by 2023 all had been pushed back to 2030 or 2031. Among those three, the project that was furthest into development and licensing, NuScale's Carbon-Free Power Project, was canceled in November 2023 because its cost projection had tripled and NuScale was not able to recruit customers to sign power purchase agreements. X-energy still projects that it will complete its demonstration project in 2030, but it has not yet submitted a construction permit application to the Nuclear Regulatory Commission.[14] The third of the demonstration projects, Terrapower's Natrium in Wyoming, has submitted a construction permit application. If the permit is approved on schedule in 2026, Terrapower would have to complete construction in four years for the reactor to be online in 2030.[15] Construction of first-of-a-kind SMRs in Russia and China has taken three to four times longer than that, at 11-12 years.[16]

Maryland has far better alternatives to the nuclear option in the ENERGIZE Act. The seminal study published in 2016, *Prosperous, Renewable Maryland*, found that our state could transition our energy systems statewide to 100% renewable energy by 2050, at a lower cost and with greater system reliability.[17] If the legislature were to review that study and develop the regulatory

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[14] U.S. NRC. "Pre-Application Activities: Xe-100." U.S. NRC. Updated February 11, 2025. https://www.nrc.gov/reactors/new-reactors/advanced/who-were-working-with/pre-application-activities/xe-100.html

[15] U.S. NRC. "TerraPower, LLC -- Kemmerer Power Station Unit 1 Application Dashboard." U.S. NRC. Updated December 6, 2024. https://www.nrc.gov/reactors/new-reactors/advanced/who-were-working-with/applicant-projects/terrapower/dashboard.html

[16] Schlissel, David, and Dennis Wamsted. "Small Modular Reactors: Still too expensive, too slow and too risky." Institute for Energy Economics and Financial Analysis. Valley City, OH. May 29, 2024. https://ieefa.org/sites/default/files/2024-05/SMRs%20Still%20Too%20Expensive%20Too%20Slow%20Too%20Risky_May%202024.pdf

[17] Makhijani, Arjun. *Prosperous, Renewable Maryland: Roadmap for a Healthy, Economical, and Equitable Energy Future*. Institute for Energy and Environmental Research. November 2016.

and planning processes needed to implement its recommendations, our state could resolve the various barriers that have made it difficult to keep pace with our renewable energy targets and climate goals. But creating a nuclear reactor procurement program will do just the opposite, bogging down the PSC in decades-long planning and construction of nuclear reactors, with a strong likelihood of burdening Maryland families and businesses with rate increases, while failing to address the fundamental policy and planning obstacles to deploying renewables and emissions-reducing technologies rapidly and affordably.

For these reasons, the Nuclear Information and Resource Service respectfully urges an UNFAVORABLE report in Committee.

https://ieer.org/wp/wp-content/uploads/2016/11/RenewableMD-Roadmap-2016.pdf