APPROACHING NUCLEAR WITH CAUTION

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WHY IT MATTERS

All around the country and world, data centers are driving increases in electricity needs and interest in emerging technologies to meet that need, including new investments in nuclear technologies. But there is a great deal of uncertainty as to where this demand growth will occur, when it will occur, and how much will occur. Numerous issues are contributing to this uncertainty, including supply chain constraints for computing equipment, the constantly evolving race for artificial intelligence, and regulatory shifts.[1] Moreover, many data center projections may be failing to account for the quantity of speculative projects that will never be constructed; according to one estimate, proposals for data centers could be 5 to 10 times greater than the number of data centers that are actually built.[2]

With Virginia at the forefront of data center projects, it is important for the Commonwealth to address this significant uncertainty sensibly—aiming to protect ratepayers from bearing all of the financial risks both for projects that go forward and projects that may never materialize—while ensuring we stay on track for Virginia's clean energy transition. If data center-driven growth projections do materialize, it appears likely that Virginia will need some amount of new dispatchable carbon-free generation to support this growth by 2045. Analysis shows that new nuclear power could play a role in this scenario, but that Virginia also has time to assess electricity growth and the viability of still-developing carbon-free technologies, including small modular reactors (SMRs)[3] and even commercial fusion reactors–one of which is being developed in Chesterfield, Virginia.[4]

At the same time, nuclear projects require a lot of capital and many years to develop, representing major financial risks to developers until they reach commercial operation. Given these dynamics, monopoly utilities are often attracted to nuclear projects, as they can generate significant returns for the utility while pushing much of the risk onto captive ratepayers rather than the utility's shareholders. The recent track record, especially in the Southeast, is not great.

Georgia Power recently commissioned two new units at its Vogtle nuclear plant, but they were delivered 7 years late and ran $17 billion over budget.[5] In South Carolina, South Carolina Electric & Gas (now Dominion Energy South Carolina) and Santee Cooper abandoned a nuclear project in 2017. Even though this failed project provides no electricity, customers are on the hook for $2.3 billion, which will likely take more than 15 years to pay off, or about $8 a month for a typical residential customer.[6]

CURRENT LANDSCAPE

Small modular reactors continue to hold promise, yet also face setbacks. Proponents of SMRs cite the fact that these reactors have been used in submarines, and the promise that SMRs could be produced in a more standardized and modular way than conventional nuclear power plants.[7] This standardization could, in theory, reduce costs. Yet, opponents point out that there are no operational SMRs for commercial energy production in the United States[8] and that one of the leading projects was recently cancelled after costs nearly tripled.[9] People living near proposed new nuclear sites have also expressed concerns about safety, including geologic stability and onsite storage of spent fuel.

Whether SMRs prove commercially viable or not, it is critical that Virginia strike a balance between safe and secure operations, protecting Virginia customers from the serious financial risks of new nuclear projects, and the potential need for new nuclear as a carbon-free power source.

It is notable that Virginia law already provides significant support to nuclear resources. For example, the Virginia Clean Economy Act already recognizes the role new and existing nuclear power plants and other zero-carbon technologies may play in Virginia's clean energy transition. These carbon-free resources (including new such resources that come online after 2030) reduce each utility's renewable portfolio standard (RPS) requirement in direct proportion to the energy produced by the resources. In addition, Virginia established the Power Innovation Fund in 2023 to assist with research and development of energy technologies, including nuclear.[10] The General Assembly also passed legislation in 2024 that allows Dominion and Appalachian Power to charge customers for early SMR development costs, even if the project never produces electricity.[11]

However, the role that states can play in supporting new carbon-free dispatchable technologies like SMRs is limited. Licensing of commercial nuclear reactors, including SMRs, is determined at the federal level. In 2024, the U.S. Congress passed, and the president signed, the bipartisan ADVANCE Act, which cuts regulatory costs nearly in half for developers and should significantly shorten application processing.[12]

OPPORTUNITIES

With significant state policy support already, Virginia can continue using these policies to explore nuclear projects like SMRs. But efforts to streamline permitting around nuclear should be approached with extreme caution and a thorough understanding of the risks involved with nuclear development. Companies and decision makers should understand that early and transparent engagement with potential host communities is not only necessary, but may actually speed up long project development timelines. The significant risks, which include lifecycle environmental risk (uranium mining, transport, and waste disposal), operational risk (accident risk and security), and financial risk (long development timelines, emerging designs), must be thoroughly examined by regulators and explained to community members.

The State Corporation Commission (SCC) can also use available tools to shield ratepayers from the financial risks associated with the development of new nuclear projects, including SMRs. If utilities choose to pursue new nuclear, exhausting federal funding options is

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one sensible way to minimize costs to ratepayers. Moreover, the SCC and regulated utilities could consider innovative financing structures that place more risk on the private sector and less risk on ratepayers. These tools may include financing arrangements with large commercial energy users like data center companies. Data center companies have entered into agreements with developers and utility companies across the country in recent years to finance new dispatchable generation resources like geothermal and new nuclear. Decision makers should carefully consider these opportunities to shield captive customers from cost risks associated with these first-of-a-kind projects.

It will take more than a decade to bring new nuclear and other new carbon-free dispatchable technologies online. In the meantime, our legislators and regulators must set Virginia up for success by emphasizing proven low-cost technologies that provide clean power and grid resilience, like solar, wind, and storage. A short-term focus on these proven technologies will allow more certainty around electricity demand to unfold and enable better decision-making.

TOP TAKEAWAYS

Focusing on proven low-cost technologies like wind, solar, and battery storage will protect Virginia customers while we decarbonize. It will also give lawmakers, regulators, and other stakeholders time to assess electricity demands and emerging carbon-free generation resources.

Regulators could look to innovative financing structures for new nuclear projects that place more financial risk on the private sector and limit the risks to regular Virginians.

A thorough permitting process is needed for nuclear technology, given the significant safety, environmental, and cost risks.

ENDNOTES

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