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Nuclear Energy Institute
Comments for Public Record
NYSERDA: Draft Blueprint for Consideration of Advanced Nuclear Technologies

Please accept these comments as public record for the Draft Blueprint for Consideration of Advanced Nuclear Technologies on behalf of the Nuclear Energy Institute (NEI). NEI is the national trade association for the commercial nuclear energy industry. NEI represents the policy interests of over 300 members in the nuclear power industry, including nuclear power plant licensees, reactor designers and advanced technology companies, architect and engineering firms, fuel suppliers and service companies, consulting services and manufacturing companies, companies involved in nuclear medicine and nuclear industrial applications, radionuclide and radiopharmaceutical companies, universities and research laboratories, law firms, labor unions, and international electric utilities.

Nuclear energy is the single largest carbon-free electric generating source in both the United States and around the world. In the United States, our 94 nuclear reactors produce about half of all carbon-free energy. In New York, the existing four upstate nuclear units collectively constitute 3,300 megawatts of highly reliable, baseload, zero-emission capacity. They operate 24/7/365 and produce over 40 percent of New York's total emissions-free electric output. The nuclear plants are also one of the state's largest employers, supplying 2,900 direct jobs. This Blueprint details how the state aims to further bolster New York's energy mix with advanced nuclear.

Last year, 20 states took action to incentivize new nuclear projects into their communities and over 20 states have taken action to support nuclear already this year. With over 30 new nuclear projects being considered for construction across the United States, New York in smartly considering the world's largest form of clean energy at the right time.

Nuclear energy is poised to expand in the U.S.

NEI believes our nuclear energy future will include safe long-term operation of our existing nuclear power reactors through subsequent license renewals to allow operation out to eighty years or more.

The existing domestic nuclear fleet is a central part of our nation's critical infrastructure and should not be taken for granted. Policymakers in state capitals, including New York, and Washington DC have taken action to preserve reactors that were at risk of closing prematurely, by valuing those reactors for their emissions-free generation. These actions have had the added benefit of preserving more than ten thousand family-wage jobs.

Most recently, the U.S. Congress passed two consequential pieces of legislation, the Bipartisan Infrastructure Law and Inflation Reduction Act, that explicitly recognize advanced nuclear as a critical solution to our energy problems and provide significant financial incentives for the deployment of

advanced reactors.[1] States are also taking action to pass policies to support advanced reactors, similar to the options identified in a recent NEI report.[2]

The United States, fueled by private capital and innovation, has recently experienced a surge in advanced reactor technologies with dozens of projects worth billions of dollars being announced over the past year. One thing is clear, states that have policies that support and encourage the deployment of advanced reactors, also have companies planning projects, which lead to future jobs and economic growth, in addition to reliable, clean and affordable energy.

Advanced reactors are an economic powerhouse

The electric utility sector in the United States is rapidly evolving. NEI believes it is in the best interest of the U.S. that nuclear power remains a significant and growing supply of clean energy as this evolution continues. Therefore, it is imperative that the commercial nuclear industry in the U.S. continue to rapidly innovate new products and designs so that these products are available when the market needs them.

According to a recent SMR Start report[3], advanced reactors can be a cost competitive and highly valuable part of our future energy system. The report also outlines the tremendous benefits to jobs and the economy, stating:

“Construction and operation of a 600 megawatt SMR plant with multiple reactors is estimated to employ about 900 manufacturing and construction workers for about 4 years and about 300 permanent positions for the 60+ years the SMR operates.” The data shows that each permanent position creates a multiplier effect resulting in 1.66 additional jobs in the local community and 2.36 additional jobs in the rest of the state. Nuclear jobs pay 36 percent more than average salaries in the local area.

“Based upon experience with a 1,000 MWe nuclear facility, a 600 MWe SMR plant is expected to generate over $500M in direct and indirect economic output annually. This includes over $270M in the plant’s electricity sales and induced spending at the local, state and national levels of $10M, $48M, and $236M, respectively. The SMR plant is expected to pay about $10M in state and local taxes and $40M in federal taxes annually.” The advanced reactor supply chain could also create thousands of jobs to support a domestic and international market.”

According to an NEI report[4], micro-reactors can also be a cost competitive and highly valuable part of our future energy system. These micro-reactors are highly resilient and reliable, clean and environmentally friendly, simple and safe, and are capable of producing electricity and heat through flexible on-demand operations.

Likewise, other reports, such as the aforementioned SMR Start report[4], similarly conclude that slightly larger advanced reactors can be a cost competitive and highly valuable part of our future energy system.

[1] https://www.nei.org/CorporateSite/media/filefolder/advantages/Current-Policy-Tools-to-Support-New-Nuclear.pdf

[2] https://www.nei.org/CorporateSite/media/filefolder/resources/reports-and-briefs/State-Policy-Options-to-Support-New-Nuclear-Energy_NEI.pdf

[3] https://smrstart.org/wp-content/uploads/2021/03/SMR-Start-Economic-Analysis-2021-APPROVED-2021-03-22.pdf

[4] https://www.nei.org/CorporateSite/media/filefolder/resources/reports-and-briefs/Report-Cost-Competitiveness-of-Micro-Reactors-for-Remote-Markets.pdf

The report also outlines the tremendous benefits to jobs and the economy that an advanced reactor can bring.

Technical Comments

NEI provides the following technical comments for New York's consideration:

1. General Comment: The NYSERDA draft Blueprint for Advanced Nuclear Technologies is a comprehensive study on the considerations that New York State should be making in the pursuit of this valuable technology to meet the decarbonization goals. Advanced reactors are one of the best suited technologies to provide clean dispatchable power for the state and attract manufacturing and technology facilities that create economic development and jobs in the state. The draft blueprint will serve as a foundational document for developing state policies that could help make this technology a reality.
2. The report does not mention New York has a partial nuclear moratorium against building on Long Island. Although building on Long Island is not likely, the momentum of the states is moving towards removing barriers and repealing moratoriums.
3. Page 10 (Section 3.4) and page 21 (Section 4.5) – "Fusion" is a very different technology than the other "fission" technologies, with dramatically longer timelines for deployment driven mainly due to the much lower technology readiness. Intermixing fusion and fission in these sections can lead to confusion and misunderstanding of the technologies and the considerations. Recommend that fusion be separated into it's own section, e.g., section 5, moving the current Section 5 on next steps to Section 6.
4. Section 4 "Considerations" – The nuclear industry has issued a roadmap for advanced nuclear technologies that discusses many of the considerations in the NYSERDA draft blueprint, including the key enablers for successful deployment that are relevant to potential actions that can be taken at the State and Federal level. Recommend that the NYSERDA report reference and incorporate relevant insights from the Roadmap: https://publicdownload.epri.com/PublicAttachmentDownload.svc/AttachmentId=83812
5. Page 21, Section 4.1, 2nd paragraph states "In the heavily regulated nuclear industry, final stages of readiness are determined by the NRC." However, this is not correct as the NRC does not determine technical readiness, but rather confirms the safety of the technology/design. While the NRC approval does require a level of maturity it is not directly tied to the readiness for commercial deployment, and in fact it is possible to achieve a maturity ready for deployment before receiving NRC approval. For example, there are several designs today that are ready for commercial deployment that have not yet been approved by the NRC. Recommend that this say "The final stages of readiness for commercial deployment can be reflected by the engagement with the NRC, supply chain and project development."
6. Page 21, Section 4.1, 3rd paragraph: To provide clarity on the historical costs and timelines for design development, recommend including after the first sentence "Historically, it has taken about 10 years and $1 billion to bring nuclear reactor designs to the level of maturity needed for commercial deployment; however, it is likely that smaller designs could be completed in less time and cost."
7. Page 13, 1st paragraph: The paragraph is relevant to non-LWR fuels, but LWR SMRs will not have the same fuel challenges. Recommend adding after the 1st sentence: "LWR SMR fuel is the same as the fuel currently used by the existing large LWR reactors."
8. Page 13, Section 4.1: This section does not convey the significant progress on fuel development. Recommend adding sentences to discuss the DOE progress on HALEU

development including the Centrus small scale production and current RFP funded by $2.7B, as well as the progress in licensing TRISO fuel facilities by X-energy and others since 2022, and the current production of HALEU TRISO by BWXT for Project Pele.

9. Page 13, Section 4.1: In response to the questions, access on information about technical readiness can be obtained from DOE and GAIN; the advanced reactor technologies are at a readiness today for more intensive consideration – as represented by the examples such as the OPG licensing and construction of the GEH BWR X300 at Darlington, the TerraPower licensing and construction of the Natrium design, and many other examples.
10. Page 13, Section 4.2.1, 2nd paragraph: The last sentence states "…negative reactivity coefficient for HTGRs and fast reactors" however, all reactors in the U.S., including today's large LWRs operate with negative reactivity coefficient. This should be clarified so that it is not misunderstood to imply that these are the only designs with this safety feature.
11. Page 14, Section 4.2.1: This section does not reflect the considerable work that the NRC has done to prepare for advanced reactor regulation. Recommend that the report add: "The NRC has been working for over 10 years to prepare the regulatory framework for advanced reactor technologies. The NRC has clarified that they are ready and capable today to license advanced reactors, and the work to modify the regulatory framework is aimed toward making that regulation more effective and efficient for advanced reactors. The NRC has made several changes already, including establishing a rule that allows the emergency planning zone to be established based on the conditions of the design and site. The NRC has also been collaborating with DOE and the national laboratories to access and develop expertise on the new advanced reactor technologies, and is advised by an independent body of experts that form the Advisory Committee on Reactor Safeguards."
12. Page 14, Section 4.2.1: In response to the questions: The role of the States in nuclear safety and security is limited to the emergency preparedness and in the environmental and other state level permitting. The NRC has sole authority over the nuclear safety of the facility and is the agency that implements the NEPA requirements. New York's ability to influence the best practices in nuclear safety would be through commenting in NRC proceedings.

a. https://www.nrc.gov/reactors/new-reactors/smr/rulemaking-and-guidance.html
b. https://www.nrc.gov/reactors/new-reactors/smr/policy-development.html
c. https://www.nrc.gov/reactors/new-reactors/advanced/modernizing.html
d. https://www.nrc.gov/reactors/new-reactors/advanced/how-were-executing/integrated-review-schedule/isd-dashboard.html

13. Page 15, Section 4.2.2: In response to the questions: NRC has stringent physical security regulations that have performance metrics that ensure that risk are low. The NRC requires nuclear plants to protect against design basis threats that are established by DHS in consultation with other relevant agencies. NRC has stringent cyber security requirements that ensure that cyber risks are low and eliminate vectors for cyber attacks.

a. https://www.nrc.gov/security.html

14. Page 15, Section 4.2.3, 2nd paragraph: The first sentence conflated "population centers" and "population densities", both are regulated by the NRC. In this usage it should be "densities" and not "centers", and the NRC recently made changes to this for advanced reactors. Recommend changing this sentence to read, and add a new sentence: "The NRC requires reactor sites to be at least 20 miles away from population densities for large LWRs. Recently the NRC established more performance-based approaches to establish distances from population densities that are commensurate with the design, allowing these designs to be safely located closer to populations." In the second sentence, change "The NRC issued guidance in 2024,… that would ensure public protection."

15. Page 15, Section 4.2.3: In response to the question: In addition to engaging through formal NRC processes, the State could facilitate education of interested communities.
16. Page 16, Section 4.3, 1st full paragraph: The discussion on open pit mining of uranium reflects antiquated methods of mining uranium. Today, mining of uranium uses methods, such as in-situ leaching, that has very little ground disturbance and environmental consequences. This paragraph should be revised to reflect current methods that are used in other countries, and would be used in the U.S. if mining were to be resumed here.
17. Page 16, Section 4.3: This section does not include a discussion on the siting of nuclear energy facilities (reactors), which have low environmental impacts even close to the plant, have high economic benefits concentrated near the plant, and have higher than average public support of locals near the facilities. The NRC is developing a Generic Environmental Impact Statement of New Reactors that would disposition 80% of the environmental assessment in light of these facts: https://www.nrc.gov/reactors/new-reactors/advanced/modernizing/rulemaking/advanced-reactor-generic-environmental-impact-statement-geis.html
18. Page 16, Section 4.3: In response to the questions: The role of the State in promoting environmental and climate justice of the fuel cycle of advanced nuclear should be similar to the role it has for the sourcing of materials for the renewable and fossil fuel technologies, including cobalt and other heavy or rare earth materials. For climate justice, the nuclear industry has a set of environmental justice principles: https://nei.org/fundamentals/environmental-justice-principles. To address underserved and historically marginalized populations, nuclear energy facilities offer high paying secure jobs, many of which only require a high school diploma, the companies offer training to up skill workers, and the State could develop programs at local trade schools, colleges and universities to create a pipeline of other workers.
19. Page 17, Section 4.4.4, 1st paragraph, 2nd sentence: The lack of design details does not drive higher costs, but rather cost overruns as costs were underestimated. Recommend revising the sentence to state: “Like all new technologies the first-of-a-kind will be higher, for example through less efficient execution and one-off specialized parts and are expected to be reduced through repetition and learnings to achieve more reasonable nth-of-a-kind costs. In cases where the design is not mature there will be higher risks of cost overruns.”
20. Page 17, Section 4.4.4, 2nd paragraph: It should be noted that costs are region dependent, for example differences in labor costs.
21. Page 17, Section 4.4.4, 3rd paragraph: This section does not include key information such as: end users are expressing a willingness to pay higher than market for nuclear because of the clean reliability and dispatchability benefits, and studies have shown that even at high nuclear costs the lowest cost systems include significant amounts of nuclear energy (https://www.vibrantcleanenergy.com/wp-content/uploads/2022/06/VCE-NEI-17June2022.pdf), and that the costs of Vogtle 3 and 4 even with the setbacks and cost overruns are more affordable than current bids on off-shore wind.
22. Page 17, Section 4.4.4: In response to the questions: The likely realistic cost range is best identified in a recent INL report (https://inldigitallibrary.inl.gov/sites/sti/sti/Sort_107010.pdf), States should assess cost factors through following industry actions to minimize new nuclear financial risks through the learning of lessons (e.g., NEI’s construction best practices efforts: https://www.nei.org/CorporateSite/media/filefolder/resources/reports-and-briefs/NEI-20-08-Public-Executive-Summary-Construction-Best-Practices-Rev-0-(2020-04-06).pdf) the White House Project Management Working Group. Key questions for the States: How to deploy large capital projects in markets that have high risks of future revenue generation (e.g., is there a need for compensation of dispatchability to ensure capital costs can be recovered).

23. Page 19, Section 4.4.5: Note that NEI has a strategic workforce plan and is working on action plans to help attract, train and retain the workforce of the future.
24. Page 19, Section 4.4.5: In response to the questions: NY should consider whether and how to incentivize suppliers in the state, the potential for the supply chain to be a bottleneck to the throughput of new nuclear deployments, the positive benefits that incentives can play to develop the supply chain, the opportunities created by national shortages and national policies for domestic content, and the role that the States can plan in workforce development through the funding of trade school and community college programs for nuclear worker training.
25. Page 20, Section 4.4.6: The section and questions do not recognize or address the unique challenges in competitive markets that create barriers to technologies with high capital costs, like new nuclear. The NYSERDA blueprint should include discussion of mechanisms that could address these challenges and enable investments to deploy new nuclear in NY.
26. Page 21, Section 4.4.7: In response to the questions: The key issue of fuel supply is HALEU that is needed by non-LWR technologies, and for which DOE is providing support to establish a commercial supply; there is limited ability of States to address the fuel supply, but they could provide incentives to attract any new facilities that may need to be built.
27. Page 22, Section 4.5: In response to the questions: Given the low technology readiness of Fusion and unlikeliness that they will be capable of commercial deployment within the next 20 years, the most appropriate role of the state is to monitor the technology development and to promote university collaboration on the fundamental R&D that is still needed to demonstrate technical viability.
28. Page 22, Section 4.6: This section is missing some key points: The U.S. industry, and by extension rate payers for nuclear energy, have paid for the Federal government's disposal of used fuel, and about 95% of the total energy still remains in the used fuel, which can be recycled and reused when it becomes economically viable, some advanced reactor designs are considering the use of used fuel as their new fuel, and internationally countries like Finland and Canada demonstrate that it is possible to find communities that are willing to host used fuel disposal facilities. https://www.nei.org/advocacy/make-regulations-smarter/used-nuclear-fuel/
29. Page 23, Section 4.6: In response to the questions: As there is relatively little difference between the used fuel impacts based on various advanced reactor technologies, the State should not let the consideration of the used fuel drive the decision on the nuclear technologies, though it could be one of a number of factors that influence state activities. The State could encourage the federal government to take actions to address used fuel management such as the siting of a final disposal facility.

NEI applauds New York's consideration of new nuclear to meet the state's climate and clean energy goals. NEI encourages NYSERDA to consider the benefits of nuclear in New York's energy strategy. As the state looks to explore new nuclear, please look to NEI as a resource for further technical and policy assistance. Thank you for considering NEI's comments.