## NYSERDA Draft blueprint for consideration of advanced nuclear technologies

Below please find comments on the draft blueprint for consideration in the preparation of the final document. My comments are organized by page and paragraph.

| Page | Para | Comment |
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| 2 | 1 | The report should not be limited by the CAC's analysis of 2022, which does not consider the growth in firm energy needed to support planned or proposed builds in NYS of fabrication plants, data centers, etc. These incremental demands are measured in 10s of GWs. Importantly, it makes no economic sense to use nuclear energy to complement intermittent sources of energy, namely, wind and solar. Capacity factors for nuclear plants are around 95%, and full advantage should be taken of this firm, clean, green energy. |
| 2 | 1 | Missing from this discussion is a clear statement of the projected growth in the demand for firm energy in NYS, and the underlying assumptions, and the increase in demand as a function of time through 2050. |
| 2 | 2 | If there are commercially viable, near-term *options* for hydrogen and long-term storage (i.e., GWe for 18 to 24 hours), please identify them. Otherwise, delete them as "options" and strike "highly positive" from the last sentence. |
| 3 | 2 | Explain why advanced nuclear should not serve as baseload because solar and wind cannot. Although some advanced reactors can cycle, it makes no economic sense to do so. For the record, all reactors are "controllable". |
| 3 | 4 | Not all advanced reactors are "modular". Correct to "In addition, many advanced nuclear reactors…" |
| 4 | 2 | Reference 12 is dated. Consider the information published by Constellation Energy last week regarding the re-opening of one unit at TMI: jobs, tax base, etc. |
| 4 | 3 | Repowering coal plants with advanced nuclear was first proposed many years ago. See https://www.terrapraxis.org/publications for information. Repowering coal plants and reusing some balance of plant and existing transmission is one pathway to a socially and economically just energy transition. |
| 4 | 4 | Supply chain opportunities for NYS should be investigated soon because there are opportunities to build mechanical, electrical, instrumentation, and control systems for nuclear plants across the United States, including NYS. |
| 5 | 1 | In my opinion, rebuilding an industrial base (e.g., steel, aluminum, chemicals, hydrogen) in WNY, and Buffalo/Niagara in particular, should be a NYS priority. Abundant process heat and firm electricity will be needed to do so. |
| 6 | 1 | The large light water reactors (AP1000) recently brought online at Plant Vogtle (Units 3 and 4) have passive safety features. The first paragraph should be corrected to make this clear. |
| 6 | 3 | Table 1 lists the AP1000, which is not "under development today". It has been deployed as Units 3 and 4 at Plant Vogtle. There are other LLWRs that could be deployed in NYS if cost competitive, including the South Korean APR1400. |
| 13 | 1 | For completeness, make reference to recent developments by ORANO (https://www.orano.group/usa/en/our-portfolio-expertise/advanced-reactors/haleu) and CENTRUS (https://www.centrusenergy.com/news/centrus-makes-first-haleu-delivery-to-u-s-department-of-energy/) regarding the production of HALEU. |

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| 13 | 2 | Missing from the key questions are “How soon could the State break ground on AP1000 builds to deliver clean energy?” and “Where should the State consider siting multiple units of AP1000?” |
| 13 | 3 | It is unclear what is intended by “nuclear safety”. No-one died of radiation poisoning following the accidents at TMI (1979) or at Fukushima (2011)—and for perspective, 20,000+ deaths were associated with the 2011 tsunami. The 1986 Chernobyl accident is well documented but by-and-large uncoupled from US plant designs and operations. None of the accidents were associated with modern nuclear reactors and this should be made crystal clear. |
| 13 | 4 | The risk targets used to design advanced reactors are orders of magnitude more stringent than those applied to any other civilian infrastructure, including buildings, bridges, and chemical facilities. This important point is missing from the discussion on risk in Section 4.2.1. |
| 14 | 1 | It is impossible to eliminate all risk whereas the first sentence indicates otherwise. Many of the so-called “advanced” technologies are decades old and so the “reactions” are very well established. |
| 14 | 1 | What “projected environmental conditions resulting from climate change” are concerning to the writers? I suspect the impact on a nuclear power plant of sea-level rise, flooding, and extreme winds will be negligible. |
| 14 | 2 | Consider confirming the accuracy of the statement made in the first example (i.e., questioned under certain conditions) with a reputable nuclear engineer with deep knowledge about sodium-cooled reactors. |
| 14 | 3 | Please provide the evidence that “…the agency is rushing approvals in response to criticisms” or delete the statement as unfounded and inflammatory. Consider asking the NRC for their opinion. |
| 14 | 4 | The key questions are poorly posed. The State does not have the technical experience to participate in or monitor the NRC, and so cannot contribute in a useful, meaningful way. The State has no recent experience building a nuclear plant and so cannot improve “best practices in nuclear safety.” US nuclear plants are sufficiently safe, and are, by far-and-away, the most robust of all civilian infrastructure. |
| 15 | 3 | Please identify the “significant physical security risks”. What are the perceived cyber security risks? If not listed and reputable sources are not identified, this discussion adds no value to the blueprint. |
| 16 | 2 | Did the authors independently confirm the statements made in this paragraph? If not, the text does not belong in the blueprint. The Occupational Safety and Health Administration (OSHA) sets workplace limits for uranium exposure, and the Mine Safety and Health Act sets standards to protect uranium miners. |
| 16 | 2 | I doubt if communities around a new nuclear plant will be overly interested in “economic and climate justice issues” in other states or countries but rather be focused on well-paid, important jobs in their community, building tax base, etc. Consider first polling rural NYS for their opinion, and thereafter reflect on economic justice. |
| 16 | 3 | Perhaps the State should be active in the fuel cycle by processing uranium into LEU, HALEU, and HEU (for the US Navy) by hosting CENTRUS, ORANO, and/or SILEX. The opportunities here are measures in billions of USD per annum. |
| 16 | 3 | See bullet 2. Communities around nuclear plants in much of the US are highly supportive, in part because the plants are safe and in part because they offer well paid, |

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| | | important jobs, that build tax base and enduring communities. This outcome is ignored in the narrative for reasons that are unclear to me. |
| 16 | 3 | See bullet 3. If nuclear plants are built and operated in NYS, underserved and historically marginalized populations will have access to training and jobs that will not exist otherwise. Consider making this point crystal clear. |
| 17 | 1 | There are lessons to be learned from the build at Plant Vogtle and the cancellation at VC Summer. The narrative misses most of the lessons learned. |
| 17 | 2 | The authors have no basis for the statement that FOAK cost will be "high and very uncertain" aside from the experiences at Vogtle and VC Summer. The statement "because details underlying the design, construction, and manufacturing remain exploratory and immature…" suggests that the authors have no first-hand knowledge of the process. If the authors are credentialed, they should provide them. Lacking credentials, the second paragraph should be deleted. |
| 17 | 3 | Missing from this discussion is the importance of collocated builds of large light water reactors. Consider adding the available data from the cost and time to build Vogtle 4, which lagged Vogtle 3 by 12 to 18 months. The biggest challenge to building a mega project is assembly of the workforce, which was a lesson learned at Plant Vogtle and is lesson being applied, with great success, in Canada. |
| 18 | 1 | The questions are poorly posed. What cost range for what technology? What is the cost of transmission and how quickly can it be built? What is the demand and how does it grow with time? The State is very poorly positioned to answer the second question but could assemble a task force to do so. |
| 18 | 2 | The challenge faces all mega projects and not just nuclear power plants. What is "interrelated nature of complex nuclear construction"? Other sectors (e.g., oil and gas, buildings) build large projects on time and budget and these lessons can be learned in the nuclear industry by direct engagement. |
| 18 | 3 | The industry is laser focused on eliminating N-stamped components where possible. And there is an alternative that the authors ignore, namely Commercial Grade Dedication. The paragraph is alarmist and inaccurate. |
| 19 | 1 | The number of workers needed to build a large light water reactor is greater than 1,200. Southern Company can provide accurate information related to Vogtle 3 and 4. |
| 19 | 2 | Some of the questions are poorly posed. 1) Plant- and design-specific examination is the role of NRC inspectors and not NYS. 2) Perceived supply chain shortages should be considered opportunities and not necessarily challenges, per 4). 5) What is "readiness training"? |
| 22 | 4 | If the authors have evidence of "the risks of their failure increase", provide it and the mean annual frequency of release of radionuclides in an amount that will pose a threat to public safety. If there is no evidence, delete the last two sentences in the paragraph. |
| 23 | 3 | The management of spent nuclear fuel (and not waste) is a role of the federal government. Other plans to store spent fuel are available (e.g., deep geological repositories, for example, https://www.deepisolation.com/) but not mentioned here. |