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October 8, 2024

NYS Energy Research and Development Authority
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Re: Draft Blueprint for Consideration of Advanced Nuclear Technologies

The Draft Blueprint for Consideration of Advanced Nuclear Technologies ("Draft Blueprint") correctly identifies two of four crucial issues (cost overruns and unpredicted delays) that pertain to any proposed rebranding of nuclear technology as a welcome member of New York's energy mix. The Draft Blueprint does not adequately characterize the other two crucial issues (nuclear waste and issues of proliferation and security). Based on a careful assessment of these four crucial issues – and perhaps also on operational "upsets" such as unintended discharges that cannot be readily quantified – new nuclear power facilities should not be pursued as part of the state's energy mix.

Climate change certainly needs attention and resolution, but not from nuclear technologies that continually add to the worldwide glut of waste that has no home, and would keep adding to the global problem of nuclear proliferation (especially plutonium-239), and are unlikely to meet time deadlines needed for meaningful response to the climate crisis. Public money and development efforts are better spent on available and emerging renewables and energy-storage technologies.

Cost overruns and unpredicted delays

These are characterized reasonably well in the Draft Blueprint, which states as an example that:

> Nuclear plants in the U.S. have a long history of substantial cost overruns. The most recent commercial reactors to be completed, the Vogtle units, were originally estimated to cost $13 billion ($5,834/kW) but eventually cost $32 billion ($14,362/kW), with a 7-year delay.

Draft Blueprint at 16. The Draft Blueprint goes on to discuss maturity of technologies, learning curves, etc., which are valid factors that can reduce overruns and delays, but these are front-end delays in the sense that so-called advanced nuclear technologies are not yet mature and not yet well-advanced along the learning curve. Given the need for immediate climate action, various available and emerging renewables and energy-storage technologies provide more immediate (thus more meaningful) pathways to an affordable and sustainable energy future.

Nuclear waste and issues of proliferation/security

As discussed below, the waste issue and proliferation/security issues and their "key questions" are inadequately characterized in the Draft Blueprint. A quick indication of this inadequacy is that the words "West Valley" are absent from the Draft Blueprint, and the word "plutonium"

appears only once (not in the text but only in one of the footnotes). The following paragraphs discuss these waste and proliferation/security issues in more detail.

The State, especially in view of its prominent role on the world stage, has a duty to act wisely and prudently in its policies and actions. The Draft Blueprint improperly says otherwise; it suggests that the State can effectively abdicate to the U.S. Nuclear Regulatory Commission (NRC) on nuclear proliferation/security issues:

> In addition to perceived safety risks from the reactor facility designs, ensuring physical security and non- proliferation of nuclear materials related to advanced technologies are concerns that are the responsibility of the NRC and other national entities.

Draft Blueprint at 14. While the NRC has an unquestioned role in proliferation/security issues *if and when they exist*, the Draft Blueprint ducks the State's discretionary decision of whether to invite new streams of commercial fissionable material into the state. Any one stream of new fissionable material is unlikely to result in a proliferation/security breach – but all else being equal, logic dictates that the risk of such breaches will rise in approximate proportion to the number of commercial streams in operation.

Similarly, the Draft Blueprint's key questions about whether advanced nuclear facilities "pose any significant physical security risks for the State," or whether cyber security events raise similar concerns, is too narrowly focused. Bringing additional commercial nuclear streams into operation raises the risk (of either physical breaches or cyber events) in a manner that is unlikely to be restricted by state lines. The Draft Blueprint needs to focus on the broader geography of risks and impacts.

The Draft Blueprint's understanding of waste issues is similarly deficient. Part of the missing background information is the absence of any reference to NYSERDA's failed nuclear waste site near West Valley, NY.[1] The site operated from 1963 to 1975 for radioactive waste burial and 'spent' nuclear fuel reprocessing. Since about 1980 the State-owned site has been undergoing cleanup by the U.S. Department of Energy, NYSERDA, and their contractors – with the cleanup work generally being done with far more care than the failed 1963-1975 operations. Cleanup work to date has cost roughly $3 billion, and the cost of full site cleanup was estimated several years ago to be an additional $10 billion.

Is this experience at the West Valley waste site relevant to the current proposal to consider Advanced Nuclear Technologies? If not, why not? Is it unreasonable to expect that the State would complete full cleanup of the site (i.e., fully remediate the old problem) before embarking on a new endeavor that generates nuclear waste?

The Draft Blueprint misunderstands and/or misrepresents the generation of nuclear waste within nuclear fission reactors (either existing reactors or 'advanced' reactors) and how the waste problem relates to the proliferation/security problem. Simply put, the nuclear fuel that goes into

[1] Failed in commercial viability; deficient with respect to seismic standards of the 1970s; failed with respect to occupational exposures to radiation for both full-time and temporary workers; deficient with respect to emissions to water and air; deficient with respect to siting; etc.

a reactor typically contains a mixture of fissile uranium-235 and non-fissile uranium-238, sometimes accompanied in 'mixed-oxide' fuel by fissile plutonium-239. The neutron flux within a reactor converts some of the uranium-238 to plutonium-239, and also causes atoms of uranium-235 and plutonium-239 to split into smaller atoms that are called fission products. Such splitting generates heat in accordance with $E = mc^2$. The fission products – together with unreacted uranium and plutonium if not recovered by reprocessing – are the main constituents of the nuclear waste that comes from nuclear reactors.

As already noted, fuels may contain plutonium-239, or they may be enriched to various levels of uranium-235, thus varying the ratios of uranium-235, uranium-238, and plutonium-239 in the fuel that goes into a reactor. To a limited extent, these ratios will change the distribution of fission products and resulting heat production, but heat production remains governed by $E = mc^2$. Claims of waste reduction in the Draft Blueprint (at 22-23) thus need to be quantified, and also need to be clarified (e.g., waste reduction per unit energy generation or unit burnup? Waste reduction measured by mass or volume or activity?). Vague claims of waste reduction cannot support decisionmaking on key questions such as waste management capabilities and overall environmental impacts.

Putting plutonium-239 into reactor fuel raises the aforementioned concerns about nuclear proliferation and security. Vague references to "waste-reducing measures [that] could come from technology and fuel choice, such as the use of 'fast breeder' reactor technology" (id. at 23), cannot support responsible decisionmaking without acknowledging and addressing the use of plutonium fuels and the proliferation/security issues they raise.

Assessments of state/federal responsibilities also need improvement. For example, the Draft Blueprint claims that, "Ultimately, the responsibility for building a waste disposal plan for advanced nuclear technologies rests with the federal government." While this may be true on paper, there is no enforceable mandate that requires the federal government to create or build a waste disposal plan. At NYSERDA's West Valley nuclear waste site, for example, federal law (the West Valley Demonstration Project Act) requires the U.S. Department of Energy to dispose of solidified high-level waste, yet that waste remains onsite and will remain there for the foreseeable future because there is no federal waste disposal plan or repository. *The Draft Blueprint needs to recognize that a federal waste disposal plan is currently an empty promise. The State should not pursue or authorize any new nuclear technologies, advanced or otherwise, until a federal waste disposal plan is in place to accept both the West Valley waste and waste from new facilities*.

Thank you for this opportunity to submit comments.

Sincerely.

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