Comments of GE Vernova/GE Hitachi Nuclear Energy on NYSERDA's Draft Blueprint for Consideration of Advanced Nuclear Technologies

GE Vernova appreciates the opportunity to provide comments on New York's *Draft Blueprint for Consideration of Advanced Nuclear Technologies* prepared by The Brattle Group for the New York State Energy Research and Development Authority (NYSERDA).

GE Vernova is the nation's first purpose-built company to deliver and innovate the technology to decarbonize the energy sector and electrify the world simultaneously. We are headquartered in Cambridge, Massachusetts with more than 75,000 employees across 140+ countries around the world.

In addition to providing many of the critical technologies core to a successful global energy transition, we use our voice globally to advocate for ambitious greenhouse gas emission reduction targets aligned with the goals of the Paris Agreement and in the service of energy justice. As a company that helps power 25% of the world's electricity, we have set an ambition to be net zero in the emissions from the products we sell by 2050—meaning the world's electricity providers are counting on GE Vernova to innovate and deliver the technology to decarbonize the energy sector while at the same time growing access to reliable, affordable, and sustainable electricity for everyone.

Many of our customers operate in carbon-intensive industries that are at the center of the energy transition, and partnering with them to help reduce emissions with our technology will play an important role in the broader decarbonization of the economy. As a technology provider, we are particularly aware of the engineering challenges still to be solved to make the ambition of net zero a reality, and that many of the solutions will need to be developed in collaboration with policymakers and other companies. Thus, our net zero ambition includes focus on certain breakthrough technologies including hydrogen, carbon capture, and small modular nuclear reactors to enable success for our 2050 net zero ambition.

GE Vernova has a substantial footprint in New York, with close to 3,000 employees working across our manufacturing facility, research and lab space, and offices. Our global nuclear business GE Hitachi Nuclear Energy (GE Hitachi) is headquartered domestically in Wilmington, NC. GE Hitachi is a joint venture between GE Vernova and Hitachi. The two companies formally established a global alliance in 2007 by combining their respective nuclear power businesses.

As the leading provider of energy transition technology, we welcome the opportunity to offer constructive comments and feedback on the *Draft Blueprint for Consideration of Advanced Nuclear Technologies* (Draft Blueprint).

Our View of Advanced Nuclear

GE Hitachi believes that nuclear energy will play a critical role in the global energy transition. Nuclear power's ability to provide standalone 24/7 carbon free, dispatchable load is unmatched. We believe nuclear can play a differentiated and critical role in solving the energy trilemma of sustainability, reliability, and affordability.

Sustainability: Nuclear plants are increasingly valued as a baseline technology for clean energy production and new nuclear is well-positioned to compete in a renewables-dominated future. Nuclear

plants require a significantly smaller footprint compared to wind and solar and can potentially drive deep decarbonization of industry through process heat applications.

Reliability: Nuclear provides 24/7 baseload at >90% capacity factors, while maintaining a safety record that is superior to other sources/industries. Reliability is enhanced with energy security and nuclear power is enabled by a globally diversified and secure supply chain that supports the development of a highly skilled domestic industry.

Affordability: Advanced nuclear developers are focused on driving down costs through serial construction of simplified and standardized designs. Shorter construction duration compared to conventional nuclear will reduce the cost of financing and further reduce investment risk. Other benefits include the potential to rejuvenate communities through high paying jobs, localized supply chains and other economic multipliers that improve societal affordability.

Today, nuclear power provides 10% of global electricity generation and 30% of the world's clean energy. Meeting the United Nations average 1.5°C scenario would require installed nuclear capacity to almost triple, from around 400 GW today to 1,160 GW by 2050. Achieving this expansion will require commitments to extend the long-term operations of existing plants and new deployment of both large-scale and small modular reactors (SMRs).

GE Hitachi in NYS

Currently in the state of New York, nuclear power generates ~21% of the state's electricity and ~42% of its carbon-free power, avoiding over 12 million metric tons of carbon emissions annually[1]. This power is generated by four nuclear reactors, three of which are GE Vernova boiling water reactor technology. New York's nuclear fleet also provides for 2,900 high-paying, reliable jobs, and powers 3.9 million homes[1]. GE Hitachi nuclear technology has been powering the state of New York beginning in the late 1960's.

GE Hitachi is a world-leading provider of advanced reactors, fuel, and nuclear services. Currently, GE Hitachi services all four nuclear reactors in New York, allowing the plants to operate with a 95.8% capacity factor from 2021 to 2023[1]. The professional workforce that provides these services has spent more than $4 million at local NY hotels, restaurants and other businesses over that same time frame. Our fuel business designs and manufactures the fuel that powers the single unit R.E. Fitzpatrick plant and 2-unit Nine Mile Point plant, both located in Oswego County. In the three years from 2021 to 2023, our nuclear business spent ~$7 million with over 40 New York-based companies to support nuclear technology and support the local workforce and communities.

GE Vernova/GE Hitachi Background

Our company has a storied 60 plus year history in the nuclear industry that yields incomparable world leading expertise and credibility today. We have licensed 67 reactors in 10 countries and issued over 6,600 boiling water reactor patents worldwide. GE Hitachi's diverse team of experts not only services

[1] Nuclear Energy Institute

existing nuclear power plants around the world to keep them safe and operating, but is working tirelessly to develop the next generation of advanced nuclear technology.

Small Modular Reactors (SMRs), defined as a nuclear reactor between the size of 20 and 300 MW's that can be built using modular construction - generally offer a lower cost and lower risk option to conventional large scale nuclear reactor projects. GE Hitachi has developed an industry leading SMR, the BWRX-300, a cost-competitive, 10th generation boiling water reactor (BWR) based on U.S. licensed large reactor technology (ESBWR). This is similar technology to most of New York's existing nuclear fleet. The BWRX-300 is not just smaller, through breakthrough and patented innovation this reactor design is inherently simpler, requiring less concrete and steel per MW than other designs. In addition, it is powered by commercially available fuel that is currently used in operating reactors. The BWRX-300's innovative design will deliver ~300MW of carbon-free power and is ideally suited for electricity generation or for industrial applications including hydrogen production and district heating.

GE Hitachi rendering of BWRX-300

It is important to note that the BWRX-300 is in deployment, it is not a demonstration project. In Canada, the BWRX-300 has progressed through the regulatory process and the Canadian Nuclear Safety Commission (CNSC) has recommended the approval of a construction permit with an anticipated approval in early 2025. In the United States, GE Hitachi is progressing our work with the Nuclear Regulatory Commission (NRC) and Tennessee Valley Authority. Because the BWRX-300 design is derived from the previously NRC approved ESBWR (economic simplified boiling water reactor), GE Hitachi is currently in the process of utilizing Licensing Topical Reports (LTRs) to reach preliminary approvals of design changes seen in the transition from the ESBWR to the BWRX-300. At this time, six LTRs have been approved by the NRC and another one is in process. A Preliminary Safety Analysis Report (PSAR) for our first deployment in the U.S. with the Tennessee Valley Authority (TVA) is also being readied for submittal to the NRC.

The BWRX-300 has been selected by Ontario Power Generation (OPG) to be the first grid-scale SMR constructed in North America, with up to four units being planned for OPG's Darlington site in Ontario, Canada. It is relevant to note that the Darlington site sits approximately 50 miles across Lake Ontario

from Niagara County, New York. Early site preparation work for the first unit has been completed with construction expected to start in 2025 and commercial operation to commence by the end of 2029. OPG's decades of operating experience and proven track record of delivering on-time, on-budget nuclear refurbishment, combined with GE Hitachi's nuclear expertise, sets the stage for success in advancing Ontario's energy landscape. In addition to OPG, SaskPower (Canada), Tennessee Valley Authority (US), Orlen Synthos Green Energy (Poland) and Fermi Energia (Estonia) have all selected the BWRX-300 for potential deployment. In the United Kingdom, the BWRX-300 is one of four designs in the country's SMR competition.

Specific Feedback on Draft Blueprint

Section 2.1 – "Advanced nuclear technology could similarly serve as baseload duty but is designed to be controllable, thus serving as a dispatchable clean resource to complement wind and solar resources" – Consider replacing controllable with flexible.

Section 2.4 – ALL advanced nuclear reactors can produce low grade steam which can improve the economics of hydrogen production when combined with low-cost electricity. Some advanced nuclear reactors operate at temperatures that enable them to supply high-quality heat for industries such as chemical manufacturing, oil shale processing and other high-energy-demand sectors that are difficult to decarbonize.

One, if not the fastest growing high energy demand sector is the data center industry, particularly for artificial intelligence (AI) applications. This demand sector does not require high temperature heat, but rather low cost, reliable electricity and cooling for data center systems. Several retired reactors are being brough back online across the US to support data center load growth. Advanced nuclear reactors are also well suited to serve this demand and can offer significant local economic development benefits as positive ancillary outcomes of data center deployment, particularly when compared to other low carbon electricity production technology.

Section 3, table 1 – Include GE Hitachi BWRX-300 in Small Modular (<300 MW) and Water-Cooled Light Water box.

Section 3.1 – This section should be updated. Consider engaging with GE Hitachi to more fully understand where each reactor stands related to commercial viability, including our own technology. GE Hitachi is working globally in the United States, Canada, United Kingdom and Poland on licensing and deploying our technology.

Section 4.1 **–** As previously noted in our comments, GE Hitachi Energy expects to have the BWRX-300 at Darlington operational in the next 5 years.

Section 4.3 – Almost every energy technology has environmental and climate justice challenges related to mining of materials, including many renewable energy technologies. Considering including the broader context.

Section 4.4.2 – GE Hitachi's' BWRX-300 does not require any foreign supply of "N-stamped" components. The current US supply chain for nuclear does need development and scaling in order to

support NOAK levels of fleet deployment – It is GE Hitachi's view that this is very feasible given how an actual order book develops.

Final Thoughts

NYSERDA should review the Department of Energy's (DOE) *Evaluation of Nuclear Power Plant and Coal Power Plant Site for New Nuclear Capacity*[2] report as they consider advanced nuclear. Specifically, the report identifies multiple New York State locations that currently host nuclear reactors that have space and positive conditions for additional small to medium sized advanced reactors. The report also includes retired coal plants in NY that similarly have potential space for advanced reactors. The benefits of siting new advanced reactors in these locations is three-fold:

- Community Engagement and Support for Nuclear: The communities surrounding existing nuclear power plants have already been engaged by the nuclear industry and regulators at length. They typically support nuclear, understand the safety culture, have extensive plans in place to mitigate community concerns, and are aware of the strict environmental monitoring of areas surrounding the plant.

- Energy Infrastructure and Interconnection: Existing conventional nuclear sites and retired coal sites both have access to substantial existing energy infrastructure which could offer significant cost savings over other site development. Many sites may also have interconnection agreements which could help alleviate some of the lengthy interconnection challenges New York projects face.

- Economic Development & Workforce: Locating a small or medium sized advanced reactor at an existing nuclear site increases the economic impact of an existing site and adds high-paying jobs while capitalizing on the existing highly trained workforce already in place. Siting a small or medium advanced nuclear reactor at a retired coal plant can bring back some of the lost jobs and tax base without the negative impacts to air quality or the environment.

Another recent DOE report that can provide value is the *Pathways to Commercial Liftoff: Advanced Nuclear*[3] report which was published in September 2024. The report not only covers nuclear powers value proposition and essential role in decarbonizing electric generation, it also covers lessons learned and many of the topics brought up in the Draft Blueprint.

GE Vernova and GE Hitachi fully support New York's consideration of nuclear technology to address the need for dispatchable emission or carbon-free power.

For additional information, follow-up questions, or to further explore the BWRX-300 technology, please reach out to Robert Dunn, GE Vernova: ROBERT.DUNN@GE.COM or Amber Sisson, GE Vernova: AMBER.SISSON@GE.COM.

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[2] US Department of Energy - *Evaluation of Nuclear Power Plant and Coal Power Plant Sites for New Nuclear Capacity:* *https://fuelcycleoptions.inl.gov/SiteAssets/SitePages/Home/Evaluation%20of%20NPP%20and%20CPP%20Sites%20Aug%2016%202024.pdf*

[3] US Department of Energy - *Pathways to Commercial Liftoff: Advanced Nuclear:* https://liftoff.energy.gov/wp-content/uploads/2024/10/LIFTOFF_DOE_AdvNuclear-vX7.pdf