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A Call to Action: A Canadian Roadmap for Small Modular Reactors

The Ontario Society of Professional Engineers (OSPE) wishes to congratulate the Canadian Nuclear Association (CNA) for publishing the Canadian Roadmap for Small Modular Reactors (SMRs) on November 6, 2018. The document addresses a number of important challenges faced by the nuclear industry in North America.

OSPE agrees that SMRs can overcome several serious barriers to the wider deployment of nuclear energy, especially the large capital costs and the schedule and cost risks associated with on-site construction of large nuclear reactors.

However, OSPE is disappointed that your report did not address several important challenges the world faces, including:

- The limited supply of economically recoverable Uranium 235, the fissile isotope needed to start up SMRs. Canada's current reserves will only last until 2050 at current world demand. Canada should have a development track for an SMR design that can breed more fissile isotopes than it consumes so our nuclear fuel supply will meet our economy-wide needs for centuries.
- The need to better address the fear of nuclear accidents. Canada should have a development track for an SMR design that is walk-away safe.
- The need to better address concerns about burying long-lived used fuel isotopes, such as transuranic isotopes. Canada should have a development track for an SMR design that can consume those transuranic isotopes as fuel, as well as a development track for more environmentally sustainable used fuel recycling.
- The need for an affordable low-emission source of heat for industry and buildings in large urban centers. Canada should have a development track to utilize walk-away safe SMRs and district heating systems near urban centers so that thermal energy from electricity production can be used economically for industrial heat, domestic hot water and building space heating.

- The need to meet emission targets in the 2050 timeframe to meet our international climate change mitigation commitments. SMR designs that have progressed the farthest through the research and development process and that address the long-term challenges listed above have the greatest chance of success.

OSPE recognizes the industry's desire to move ahead quickly with easy-to-commercialize SMR designs. However, Canada and the world also need a long-term strategy that will address the challenges listed above.

Some SMR designs that are suitable for near-term deployment are not capable of addressing those long-term challenges. In fact, some SMR designs make the waste management problem worse by creating higher volumes of low and intermediate wastes. That near-term strategy can be justified if it is a necessary bridge to a long-term strategy, but your report did not discuss how to achieve a more sustainable low-emission energy system for future generations, or how we will get there in the 2050 timeframe.

Our political leaders must have the tools necessary to deal with our energy and environmental challenges and commitments. To ensure they understand their responsibilities for program funding, they should be made aware of short-term steps and long-term strategies that must be embraced and supported to be successful.

OSPE's major concerns are:

- Disposing of used fuel permanently in deep geological repositories (DGRs) is not prudent in light of the fact that those fuel bundles contain a significant and valuable source of both fissile and fertile isotopes. Those isotopes can be harvested if we commercialize environmentally sustainable fuel-recycling technology that has been developed in research labs in other countries. If we bury our used fuel, Canada will become dependent on foreign sources of enriched fuel to power our SMRs.
- Decarbonizing the thermal energy sector is essential and will require a significant and dependable source of both high temperature and medium temperature heat. That heat source has to be close to the load. Future SMR designs will need to have characteristics that make them suitable for deployment near urban centers. That suggests low-pressure passively safe SMR designs are more likely to be licensed to provide combined heat and power for urban centers.
- Unless Canada supports and sustains a development program for an advanced SMR design that is walk-away safe, breeds fissile isotopes and consumes transuranic isotopes recovered using fuel recycling, Canada will end up with an SMR design in a couple of decades that will not help us achieve our international climate change mitigation commitments in the 2050 timeframe.

The more advanced SMR designs are more challenging to commercialize because they require the use of unconventional reactor coolants and fuel recycling technology. However, they are capable of load following, and can enable a larger penetration of renewable energy sources and other clean energy technologies so that Canada can achieve a sustainable, low-emission and affordable energy system in the 2050 timeframe.

Canada has already demonstrated to the world how to decarbonize the electrical sector. Ontario's nuclear plants are a key component of the supply mix for its low-emission electricity sector. The math suggests that nuclear will also have to play a leading role in decarbonizing other sectors of the economy. Advanced SMRs that can supply both electricity and heat to urban centers are a key technology to achieving our environmental goals in the 2050 timeframe. Developing those advanced SMRs and associated fuel recycling facilities by that timeframe requires the development of technology and programs now.

OSPE hopes your association will engage with federal and provincial leaders and utility executives in Canada regarding the long-term energy strategies we need to embrace and support. The CNA can count on OSPE's support and engagement as we strive for success and leadership in the other energy sectors of the economy.

Yours truly,



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