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To: Standing Committee on Science and Research
Sixth Floor, 131 Queen Street
House of Commons
Ottawa ON K1A 0A6

From: Tom McLean
30 Baldwin St
New Maryland NB E3C 1C1

RE: Study on Small Modular Reactors (SMRs)

Canada does not need nuclear power. Spending public funds on small modular (nuclear) reactor (SMR) technology wastes resources which should be focused on deploying clean energy solutions using proven cost-effective renewable energy technology. Renewable energy from wind, solar, hydro, and geothermal sources can provide all of the energy Canada will need.

There are many pathways Canada can follow to net-zero greenhouse gas (GHG) emissions. Most of these do not require nuclear power. That's good for many reasons:

1. Nuclear power is the most expensive way to generate electricity.
2. All fission-based nuclear power, especially that based on SMR designs, produces toxic radioactive waste which must be stored in isolation somewhere, essentially forever.
3. Nuclear power is not needed for grid reliability.
4. Nuclear power plants are very slow to plan, build and deploy. SMR technology does not exist, may never exist, and, if it does, is highly unlikely to be helpful in the timeframes required by the climate crisis.

Canada has large resources of hydro, wind, solar, and geothermal power. Much of the hydropower is already being used to generate clean renewable non-polluting electric power. Most of the rest is largely untapped. In fact, it has been estimated and modelled that these resources could provide many times over the electrical power Canada will need both now and in a fully electrified future. All the technology needed to implement this vision already exists. Today's hydro, wind, solar, geothermal and storage technologies could be used to implement a reliable emission-free grid which would produce power at far less cost than any other options. In addition, wind, solar, and storage technologies continue to make significant improvement in effectiveness and efficiency resulting in both faster deployment times and reduction in already low costs.

Nuclear power is incredibly expensive. Electricity generated by nuclear power is 1.5 to almost 4 times more costly than that generated by wind and solar[1]. Nuclear power produces permanently toxic radioactive waste that needs to be isolated for hundreds of thousands of years, essentially forever. In comparison, wind turbine components, including blades, and photovoltaic solar panels can now be recycled after 20-50 years of productive safe power generation.

1 Rates published by Lazard https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

Nuclear power plants are promoted as “always on” power generators but, in fact, they must be shut down for maintenance and repairs. As a recent example, in the fourth quarter of 2021 Pickering nuclear power was offline for 22% of the time[2].

Highly reliable grids can be based solely on renewable power through the judicious use of power storage, east-west power transmission and geographically diverse power generation. Canada already has much power storage in the form of existing hydroelectric dams. More storage can be added using pumped-hydro, batteries, air-compression storage, etc. All of these technologies are cost effective and continue to become more so. East-west power transmission increases grid stability inter-provincially and further reduces generation costs. Deploying renewable power generation widely, such as wind turbines, also increases stability since the wind may not always blow but it's always blowing somewhere. Dr. Mark Jacobson[3] has published many papers on creating reliable, inexpensive power grids based on today's renewable energy technology. Some of his work has summarized by country, including Canada[4].

Lastly, speed is a critical part of a valid climate action plan. Major reductions in GHG emissions are needed by 2030 which is less than eight years away. Existing renewable power technologies are inexpensive and can be deployed quickly. In contrast, the construction and/or refurbishment of nuclear power plants often goes over budget and behind schedule. The Point Lepreau nuclear power plant in New Brunswick uses the well established Canadian Candu reactor so it would be reasonable to expect work on such a facility to be low risk. In March 2008 the Point Lepreau power plant was shut down for a refurbishment which was to take 18 months and cost $1.4 billion. After several delays, it finally resumed service over 4 years later at a cost of $2.4 billion dollars. Even one of the world's top nuclear power companies, EDF of France, has trouble building nuclear power plants on schedule. The Hinkley Point C power plant in Great Britain is currently hugely over budget, over a decade behind schedule and still five years from completion[5]. The introduction of new untested nuclear technology, such as SMRs, is more likely to increase, not reduce, the risk of delays and cost overruns which seems less than prudent given the low risk alternatives which already exist. It makes no sense to invest scarce public funds and dwindling time on an unproven technology proposed by an industry which has a history of delivering behind schedule and over budget.

In the middle of the 20th century, nuclear power was heralded as the power of the future which would be “too cheap to meter”. Seven decades later that vision is far from being realized. Continuing improvements in wind and solar power and power storage highlight the folly of continuing to invest public funds in a nuclear technology which, even if successful, will not be as cost-effective or clean as existing renewable energy solutions. What province or country will want to pay hundreds of dollars per MWh for power from an SMR which creates a permanent waste liability when they can more quickly deploy storage-backed renewable power for 50-75% less cost?

Please direct public funds to the development of renewable energy in Canada industry. Do not invest in SMR nuclear power. Let's leave it behind in favour of true 21st century clean power: renewable energy

2 Pickering Nuclear Performance Report https://www.opg.com/news/pickering-performance-report-q4-2021/ .

3 Dr. Mark Jacobson https://web.stanford.edu/group/efmh/jacobson/

4 100% renewable by country https://thesolutionsproject.org/what-we-do/inspiring-action/why-clean-energy/#/map/countries/

5 Hinkley Point C nuclear power plant https://www.reuters.com/business/energy/edf-says-hinkley-point-start-now-june-2027-costs-rise-2022-05-19/