

The Honourable Bill Morneau, P.C., M.P.
Minister of Finance
House of Commons
Ottawa, Ontario, K1A 0A6
By email: bill.morneau@canada.ca

Subject: Request for Government of Canada support for development of Small Modular Reactors (SMRs) in Canada

Dear Minister Morneau:

The Canadian Nuclear Association (CNA) represents all the major players in the nuclear industry. Our membership includes a wide range of public and private companies, as well as labour unions, laboratories and universities – all of which are working to bring clean energy, isotopes for life-saving medical diagnoses and treatment, advanced materials science and composites for tomorrow’s manufacturing advantage and many other benefits to Canadians.

“Vision 2050: Canada’s Nuclear Advantage” – submitted by CNA to Minister Carr’s Generation Energy – showed how nuclear technology delivers on the Government’s quest for low-carbon, environmentally sound, copious, reliable and affordable energy for Canadians – wherever they may live in Canada, whether in urbanized centres or in remote and northern communities. The document can be read here:

<https://cna.ca/vision2050>

What needs to be added is the industry’s contribution to, and potential for, expanding Canada’s economic competitiveness. There is a significant and compelling story to tell here – both for the economic good of the country as well as Canada’s international leadership in a competitive world where our “nuclear advantage” risks sliding out of our hands and into those of China, Russia and other Asian countries.



A look at industry's Ontario-specific website – <https://ontariosnuclearadvantage.com> – shows in stark numeric terms the number of jobs, the highly skilled workforce, the continuing innovation in robotics, artificial intelligence, 3-D printing and the like that is putting Ontario Power Generation's reactor refurbishment project ahead of schedule and on budget. Ontario's \$26 billion investment in the industry will ensure another three-to-four decades of substantial, clean, affordable electricity. Meanwhile, the Government of Canada has invested \$1.2 billion in re-building Canada's world-class nuclear laboratories at Chalk River. The potential for leveraging these investments is enormous.

Canada is standing today before a window of opportunity. A promising, innovative and cutting-edge development in power reactor technology can drive our economic competitiveness and give us an international leadership role. The two combined give Canada a strategic advantage in a world where markets are hungry for innovative and manageable clean energy solutions.

Small Modular Reactors (SMRs) – smaller, simpler and more portable than most current power reactors – are becoming a viable option to provide low-carbon, reliable electricity at manageable cost and risk, both for electricity grids and for off-grid communities, and for resource industries and industrial processes requiring large amounts of heat and electrical energy.

In June 2017, the House of Commons Standing Committee on Natural Resources (RNNR) released a study on The Nuclear Sector at a Crossroads. This consensus study recognized the potential for SMR development and recommended that work be undertaken to examine and promote the beneficial contribution and impact that SMR development promises for Canada.

In response, key public and private stakeholders launched the **SMR Roadmap Project**. The Project has held a series of policy discussions and workshops with Indigenous people, utilities, provincial representatives, major potential users in the resource extraction and industrial sectors, as well as communities in northern Canada that could benefit from the clean energy of small and very small reactors.

These consultations confirm the need for federal government leadership in helping the continued development in Canada of SMR technology. The time for such support is now.

Canada has an internationally recognized brand in nuclear; it has a high-performing and expanding nuclear industry supply chain (creating good jobs and employing STEM graduates with increasing gender diversity); it has world-class research & development capability, including at the renowned Canadian Nuclear Laboratories (CNL) and other industry-run specialized labs; it has nuclear reactor operators who have been recognized internationally for their abilities and achievements; and a regulator (Canadian Nuclear Safety Commission) that has driven international and domestic safety standards to the highest levels.

The Canadian government's credibility in the nuclear sector is strong and secure, backed by the breadth and depth of the industry, as well as the industry's readiness to invest in the future of nuclear in Canada. Our "**Vision 2050: Canada's Nuclear Advantage**" sets this out in detail, found at www.cna.ca/vision2050

Given the nuclear sector's alignment to Canadian government priorities on innovation, jobs and Canada's low-carbon energy future; given the enabling support that SMRs can provide to variable renewable energy sources (wind, solar) via hybrid distributed energy systems or "energy parks"; and given the importance of Canadian leadership a world where the western lead in nuclear technology risks slipping away – the time and the market opportunity is right now for Canadian-developed and Canadian-manufactured Small Modular Reactors.

With three potential markets in Canada (utility on-grid clean power needs for provinces/territories; mining and oilsands off-grid clean power needs; small/remote community off-grid needs, including Indigenous communities) there is opportunity for literally dozens of SMRs. However, the SMR market expands almost exponentially with the forecasted global demand for small, reliable and clean energy sources that many countries, including less-developed, can afford and run themselves. The country that develops, produces and licenses SMRS first will be the dominant player in this enormous, growing global market.

The following actions are needed for competitiveness success.

- **A clear policy framework at the federal level to signal support of advanced and innovative nuclear technology as an important tool in the fight against climate change.** Use the government’s convening power to support development in Canada of Small Modular Reactors (SMRs) as a made-in-Canada solution for generating low-carbon, safe energy for a broad range of potential uses (industries, homes, electric vehicles). Advanced nuclear/SMR capacity to reinforce existing on-grid generation, while enabling other clean and renewable energy sources to contribute via hybrid systems, could be a key policy outcome.
- **Financial support by the federal government (perhaps in concert with provincial / territorial partners) to “de-risk” SMR development.** In particular: “de-risk” building of SMR units (or major components) for testing, demonstration, or as the first of a kind for commercial use. New advanced designs in the next 10 years offer advantages that we should pursue, specifically financial support for R&D and for building SMR prototypes for licensing. This could be done by establishing a funding plan over a 5-10-year period, starting with \$100 million in 2019. Additional de-risking measures include loan guarantees, R&D tax credits, investment tax credits, and accelerated capital cost allowances. Also: nuclear technology should explicitly be included in federal clean technology, innovation and clean/green infrastructure programs.
- **A regulatory environment that enables SMR technology investors to develop, demonstrate, license and deploy SMRs in Canada.** The Canadian Nuclear Safety Commission – Canada’s nuclear regulator – ensures that SMRs will only be licensed if they are proven to be safe and in compliance with Canadian safety standards. Appropriate and supportive regulation of SMRs under the new federal designated project list will be key to the realization of SMR potential – not only for clean, reliable and safe energy in homes and communities, but also for the manufacturing job opportunities that SMRs in Canada would create. **Bill C-69’s Project List should be developed to support and aid the development of SMRs in Canada; if not, the future of SMR development will completely be nullified.**

The potential for exports of Canadian-made and Canadian-licensed SMRs to international markets has both an important economic and job-creation impact and would confirm Canada's international leadership on clean energy and climate change. Through exports of Canadian uranium (fuel), CANDU reactors and SMRs, Canada can give the world the most effective means of rapidly reducing GHG and carbon emissions. Moreover, Canada's brand of nuclear technology contributes to 9 of 17 UN Sustainable Development Goals. (<https://cna.ca/nuclearscienceandsustainabledevelopment>) Taken together, these put Canada at the forefront of helping the world to de-carbonize, bringing our energy and environment leadership together to provide real benefit to humanity.

An appendix to this letter briefly describes some of the applications of SMR technology in Canada and internationally. The innovative Science & Technology eco-system in Canada already exists to support the development of this technology.

CNA would be happy to discuss any aspect of this letter and the requests it makes of the Government of Canada.

Yours sincerely,



John Barrett, Ph.D.
President and CEO
Canadian Nuclear Association

Cc: Minister Sohi, Minister of Natural Resources;
Minister McKenna, Minister of Environment and Climate Change
Minister Bains, Minister of Innovation, Science and Economic Development
Ms. Christyne Tremblay, Deputy Minister, Natural Resources Canada
Dr. Stephen Lucas, Deputy Minister, Environment and Climate Change Canada
Mr. John Knubley, Deputy Minister, Industry
Mr. Paul Rochon, Deputy Minister, Finance

APPENDIX

SMR Applications in Canada and Abroad

SMRs are not so much a new technology, as a miniaturization and simplification of reactor technology for an expanding new world of applications. Many SMR technology designs are under development. Some are derived from proven nuclear reactor systems, while others are much more innovative. The SMR Roadmap will assist in defining the potential characteristics of the fleet of units, and the family or families of technology, that could best meet the needs of Canadians.

For southern Canada's power grid, SMR technologies provide a non-emitting source of electricity at the right scale to replace our remaining fossil-fuel-fired generating units. When successfully integrated with renewables, as it is in Ontario, nuclear can also provide the supply growth we will need to support greater electrification (notably in the transport system) as our society shifts away from oil and gas use.

For Canada's off-grid communities and industries, particularly in northern and remote areas, SMRs (or in these cases, probably Very Small Modular Reactors of about 50 MW or less) will eventually be an option for communities to get entirely off diesel (versus merely reducing diesel use). VSMRs will have the power to heat buildings in cold climates from a tiny footprint – constantly, reliably, and abundantly. This abundance can then promote health and social development and other economic benefits (like local greenhouses).

International market potential – A rough estimate of current worldwide coal-fired generating capacity is over 2 million megawatts. There is considerable policy will to replace these plants with a cleaner fuel, due mainly to local air quality concerns. Some of these plants might be replaced by traditional, larger nuclear plants (not SMRs). Even so, if SMRs could replace 10% of 2 million megawatts of capacity, this worldwide market represents 200,000 megawatts. Even for larger SMRs (e.g. 250 MW), this is a market of 800 SMR units.

Natural gas and oil or diesel represent about half as much generating capacity as coal (i.e. conservatively, 1 million megawatts). If SMRs could replace 5% of that capacity, this represents an additional 50,000 megawatts – or a market of 200 additional SMR units.

Reactors more than 25 years old – which is most of the global fleet – are likely candidates for replacement. If 300 reactors averaging 300 MWe in size were going to be replaced with new nuclear over the coming forty years, this implies 90,000 megawatts of new nuclear capacity. If SMRs could replace even 25% of this, then nuclear replacement calls for 22,500 megawatts in SMR capacity – or 90 additional SMR units.