

**Submission for the Standing Committee on
Finance's pre-budget consultations in advance
of the 2021 federal budget**

By: U-Battery

Recommendation:

- **Government of Canada establishes a dedicated funding program to support early-mover proponents in the Small Modular Reactor (SMR) sector as part of its SMR Action Plan. Dedicated funding would enable the Government of Canada to leverage nuclear innovation to address Canada's post-pandemic priorities: economic growth, Indigenous empowerment and regional development, and the fight against climate change.**

Introduction to U-Battery

As a subsidiary of the global nuclear supply chain company Urenco, U-Battery is dedicated to the advancement of nuclear innovation through the development and deployment of SMRs. U-Battery's advanced SMR aims to replace diesel power with clean, safe, and cost-effective energy for a variety of applications, including remote communities and other off-grid locations such as mining operations in northern regions. The U-Battery SMR is a cogeneration unit capable of producing both heat and power, differentiating it from traditional SMRs.

As part of our dual-track approach of exploring the potential in Canada and the United Kingdom (UK), U-Battery is developing an innovative, low-carbon, market-ready solution designed to address the emerging energy needs as well as sustainability and carbon reduction policies in both countries.

U-Battery is working collaboratively with governments, utilities and licensing authorities to advance its first-of-a-kind project. In July 2020, U-Battery was selected to proceed to Phase 2 of the Department for Business, Energy and Industrial Strategy's (BEIS) Advanced Modular Reactor (AMR) competition in the UK. Under the program, U-Battery will receive £10 million (\$CAD 16.9 million) in funding to conduct design and development work, the next step in bringing its SMR technology to market. This represents a major milestone as the initial call for SMR developers resulted in 23 applications, only three of which, including U-Battery, have progressed through to Phase 2.

In parallel, U-Battery has also made significant progress through the Canadian Nuclear Laboratories' (CNL) siting competition to establish a first-of-a-kind SMR demonstration unit at Atomic Energy of Canada Limited's (AECL) Chalk River Laboratories campus in Chalk River, Ontario. Further, U-Battery has established a service agreement with the Canadian Nuclear Safety Commission for pre-licensing vendor design review, as well as a memorandum of understanding with Bruce Power for design review and feasibility services. Combined, these developments will help ensure that U-Battery's design is well positioned to meet regulatory and feasibility requirements as well as Canadian codes and standards as it works towards commercial deployment.

The SMR Action Plan

In 2018, the federal government released Canada's SMR Roadmap, the culmination of 10 months of workshops and Indigenous engagement sessions aimed at fostering a collective vision statement for the eventual rollout of SMR technology. This Roadmap brought forward 53 recommendations and signalled that the Canadian nuclear supply chain and the Government of Canada were aligned on a path forward.

Since then, the federal government has continued to engage with the SMR community and is currently finalizing its SMR Action Plan¹. Developed by Natural Resources Canada (NRCan) with input from industry stakeholders, this steering document, expected to be released later this year, intends to position SMRs as an integral part of Canada's energy transformation and will support the achievement

¹ <https://www.nrcan.gc.ca/our-natural-resources/energy-sources-distribution/nuclear-energy-uranium/canadas-small-nuclear-reactor-action-plan/21183>

of its net-zero emission targets by 2050. Further, its release is timely: the COVID-19 pandemic has significantly impacted the interconnected global economy.

As Canada enters its economic recovery efforts, U-Battery contends that SMRs can and will play an important role in reenergizing Canadian industries. In fact, we believe that SMRs can spur economic growth, open up capacity for emerging or energy constrained sectors, while leading Canada's long-term decarbonization and sustainability efforts.

Thus, U-Battery recommends that **the Government of Canada establishes a dedicated funding program to support early-mover proponents in the SMR sector.** It would enable the federal government to:

- Secure the position of Canada's supply chain in global markets;
- Fortify manufacturing, expert nuclear services, and made-in-Canada jobs;
- Foster enhanced cohesion (Coast to Coast to Coast) and potential for greater (low-carbon) energy security/resilience, across Canada's Provinces and Territories;
- Create a pipeline of attractive, inclusive, diverse, global talent through Canadian universities and organizations, giving Canada a competitive advantage in the global race to innovation and research;
- Create bilateral opportunities, through strategic partnerships with some of Canada's closest allies (i.e. UK; U.S.).

SMRs: A supply chain primed for growth

Nuclear energy is an integral part of the Canadian economy, contributing upwards of \$6 billion annually while providing 30,000 direct jobs². By virtue of Canada's extensive nuclear energy experience and expertise and a globally renowned domestic nuclear supply chain, we have one of the world's most promising markets for SMRs. Conservative estimates place the potential value for SMRs in Canada at \$5.3 billion between 2025 and 2040³. Globally, the SMR market is much bigger, with a conservative estimated value of \$150 billion between 2025 and 2040⁴. This represents a large potential export market for Canada, which has already exported nuclear reactor technology to six other countries.

These characteristics make SMRs clear assets to Canada's economic recovery efforts. Canada's nuclear supply chain has embraced collaborating with the federal government on SMR development, as it understands the importance of regulatory compliance. Ultimately, the success of SMRs will be reliant on a willingness within government to strategically supplement the efforts of the private sector around cost and risk sharing.

As part of the 2021 Federal Budget, the Government of Canada should consider positioning the Canadian nuclear supply chain for sustained growth and innovation through the development and eventual deployment of SMRs by:

- Cost-sharing during the development phase;
- Loan guarantees through the construction phase;

² Call to Action: A Canadian Roadmap for Small Modular Reactors.

³ Call to Action: A Canadian Roadmap for Small Modular Reactors.

⁴ Call to Action: A Canadian Roadmap for Small Modular Reactors.

- Contracts for difference, power purchase agreements, or tax incentives to the generator in the operating phase⁵.

These efforts would strengthen Canada's nuclear sector, while ensuring its prosperity and longevity, and in turn, Canada's economic growth.

SMRs: Empowering Indigenous communities and enabling regional development in remote areas

In many ways, the economic challenges faced by northern and remote communities such as energy poverty, infrastructure reliability, and food supply issues, have only become more pronounced during the pandemic. There are currently about 300 remote communities and industrial sites across Canada, including 175 Indigenous communities, that are deprived of key infrastructure and faced with a less dynamic employment sector than the one found in urban settings. They rely heavily on diesel fuel for electricity generation and heat, and without an adequate supply, it will become increasingly challenging for these communities to accommodate growing populations, establish or expand businesses, and develop needed social and community infrastructure.

As stated by the Conference Board of Canada, *"remote communities ... do not receive the benefits that 99 percent of the Canadian population take for granted, such as guaranteed, reliable and affordable electricity (...) they rely solely on locally generated electricity, which typically comes from diesel-powered generators. This limits the potential growth of these communities, results in high electricity costs and can have adverse environmental impacts"*⁶.

The SMR Roadmap dedicated various recommendations to enable Indigenous reconciliation and regional development through the development and deployment of SMRs in remote communities.

SMRs have the potential to play a significant role on the path leading to Indigenous reconciliation while enabling regional economic development, by building constructive relationships with Indigenous communities in the form of business partnerships that allow for revenue sharing⁷. U-Battery's SMR modularity and unique capabilities for cogeneration of heat and power, as well as desalination and hydrogen production make it significantly adaptable to meet broader local needs in remote communities. Impoverished regions like Nunavut face higher food and energy costs that could be significantly reduced with a solution like the U-Battery, which would generate low-carbon sustainable energy for diesel-dependent and logistically challenged remote communities.

More specifically, benefits resulting from the commercialization of the U-Battery SMR could include:

- **Lower cost of service.** Deployment in remote communities is expected to be economically competitive against the incumbent diesel energy source with potential power. For northern remote communities, the levelized cost of electricity from the U-Battery SMR would be significantly lower than diesel generation.
- **Cost-effective energy supply options for mining uses.** For mining operations in Canada's North, energy costs can represent 30 to 50 percent of the cost of mining. Again, the levelized cost of

⁵ Call to Action: A Canadian Roadmap for Small Modular Reactors.

⁶ Power Shift: Electricity for Canada's Remote Communities

⁷ Call to Action: A Canadian Roadmap for Small Modular Reactors.

electricity from the U-Battery SMR would be lower for mining operations than diesel generation. The U-Battery SMR could also meet the expressed demand of the Canadian resource extraction industry in remote areas like Ontario's Ring of Fire and other parts of Northern Canada, including mining operations where transportation of fuels makes power expensive and where choices for replacement of diesel generation are limited. Ultimately, the U-Battery SMR could improve the competitiveness of Canadian mining operations and should accelerate their transition away from diesel.

- **Integrated microgrid networks.** The U-Battery SMR will also be capable of working as a partner for intermittent renewables, microgrids, and energy storage technologies. For example, some remote communities have started looking integrating renewable generation with the existing diesel systems.
- **Economic benefits from construction.** During the construction phase, it is anticipated that each U-Battery SMR could create approximately 100 short-term construction jobs associated with preparing the site and assembling the reactor.
- **Heat output to address broader community needs.** Heat from the U-Battery SMR could be used to support year-round greenhouses, which could help remote and Indigenous communities address food independence and security and make regional food production in the north a viable industry.
- **Supporting critical infrastructure and healthier communities.** The U-Battery SMR's on-site generation could support the provision of clean water, sewage treatment, educational and medical needs. For example, sewage treatment and water treatment and pumping can account for roughly 40 percent of a municipality's electricity demand.

SMRs: The Missing Link of Canada's Sustainable Growth Strategy

The fight against climate change remains top of mind for the Government of Canada, as illustrated through its commitment to achieving net-zero carbon emissions by 2050. Only a plan that focuses on decarbonizing our economy while diversifying our energy supply mix could deliver these results.

Nuclear innovation and SMRs could play a major part in accelerating Canada's energy transformation.

- SMRs can provide significant amounts of energy with zero CO₂ emissions, making it one of the cleanest supplies of energy. The world's current use of nuclear power already reduces emissions by approximately 2.5 billion tonnes of carbon dioxide each year, by avoiding fossil fuels.⁸ GHG emissions from nuclear power are very low and are comparable to renewables, while the physical footprint of such energy is rather negligible.
- The potential for SMR deployment in heavy industry operations such as in the oil sands and mining sites could significantly decarbonize sectors that have been heavily criticized over the past decade by environmentalists for their impact on carbon pollution. Canada could pioneer the use of SMRs in heavy industries such as bitumen extraction.

⁸ From the Canadian Nuclear Association (CNA)

SMRs hold the potential to position Canada as a global leader in sustainable energy, and the 2021 Federal Budget could considerably accelerate their rollout.

Conclusion

As the federal government looks for opportunities to accelerate Canada's return to economic prosperity, our nuclear energy sector is primed to serve as a reliable source of innovation, employment and sustainable growth, and alleviate Canadians from impacts of COVID-19. The SMR Action Plan is a bold, progressive vision for a sector that can bring significant value to this country.

By establishing a dedicated funding program to support early-mover proponents in the SMR sector as part of its SMR Action Plan, the Government of Canada would be well-positioned to leverage nuclear innovation to address Canada's post-pandemic priorities.

U-Battery would like to thank the House of Commons' Standing Committee on Finance for the opportunity to submit its input to the 2021 Pre-Budget Consultations.