

Written comments for Ontario's public consultations on the Low Carbon Hydrogen Strategy discussion paper

By: U-Battery Canada

Introduction to U-Battery Canada

U-Battery Canada is reimagining the way we power Ontarians' lives through sustainable energy development by pairing technological innovation with nuclear energy development. With an experienced network of industry-leading partner organizations—including global nuclear supply chain company Urenco and Canadian engineering firm Kinectrics—U-Battery Canada is dedicated to advancing Ontario's first commercial small modular reactor (SMR).

Our advanced SMR can enable a broad range of energy-intensive industries, including mining operations in the Ring of Fire, as well as northern and remote communities to be self-sufficient by accessing a clean, local, low-carbon, cost-effective and safe alternative to fossil fuel generation. More specifically, our SMR is designed as a cogeneration unit to produce heat and power, emissions-free, with the capabilities to facilitate hydrogen production and desalination.

Our recent milestones include:

- Contributed an industry partner chapter to Natural Resources Canada's SMR Action Plan
- Submitted comments on Ontario's Low Carbon Hydrogen Strategy discussion paper
- Progress through pre-qualification stage of the Canadian Nuclear Laboratories' invitation to site an SMR demonstration projects at their Chalk River facility
- Participated in industry consultations for Natural Resources Canada's Hydrogen Strategy
- Hosted a second Canadian Supplier Forum in partnership with Organization of Canadian Nuclear Industries
- Service agreement with the Canadian Nuclear Safety Commission for pre-licensing vendor design review.

As part of its dual-track approach of exploring the potential in Canada and the United Kingdom (UK), U-Battery (U-Battery Canada and U-Battery UK) is developing an innovative, low-carbon, market-ready solution designed to address the emerging energy needs and decarbonization challenges faced in both markets. U-Battery is working collaboratively with governments, industry organizations and licensing authorities to advance its first-of-a-kind project. In 2020, U-Battery was selected to proceed to Phase 2 of the Department for Business, Energy, and Industrial Strategy's Advanced Modular Reactor competition in the UK. Under the program, U-Battery will receive £10 million (\$16.9 million CAD) in funding to conduct design and development work, the next step in bringing its SMR technology to market.

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 Chalk River Laboratories campus in Chalk River, Ontario. Having successfully completed the pre-qualification stage, U-Battery is now preparing its submission for the due diligence stage, where CNL will evaluate the proposed design, assess its financial viability, and review the necessary security and integrity requirements.

Canada's SMR Action Plan: Unleashing the power of nuclear energy

In December 2020, [U-Battery contributed an industry partner chapter](#) to Canada's SMR Action Plan. U-Battery welcomes the federal government's commitment to providing increased access to resources and regulatory tools that will allow for the development, construction, and deployment of SMRs across the country. Canada has one of the world's most promising domestic markets for SMRs, fuelled by a synergy between proponents, utilities, and regulatory bodies. Conservative estimates place the potential value for SMRs in Canada at \$5.3 billion between 2025 and 2040. Globally, the SMR market is much bigger, with a conservative estimated value of \$150 billion between 2025 and 2040. SMR development and deployment will enable significant investment into the Canadian and Ontario economies as they recover from the COVID-19 pandemic and beyond, while concurrently enabling global export opportunities. U-Battery is confident that its advanced SMR will deliver significant environmental, economic and social benefits across Ontario and the rest of the country while enhancing Canada's status as an innovation hub and nuclear energy powerhouse.

U-Battery Canada's advanced SMR design has the potential to drive significant national and regional economic benefits. For northern and remote communities as well as off-grid mining and heavy-industry operations, the cost of power generation for U-Battery's advanced SMR has the potential to be economically competitive against the incumbent fossil fuel generation. The U-Battery SMR could improve the competitiveness of Canadian mining operations in remote areas like Ontario's Ring of Fire and other parts of Northern Canada, by accelerating their transition away from diesel.

Developing Ontario's hydrogen sector

Last year, U-Battery also participated in industry consultations for the Canadian government's Hydrogen Strategy as an active and contributing member of the Canadian Nuclear Association (CNA). According to industry estimates, the hydrogen sector has the potential to create domestic market revenue of up to \$50 billion per year by 2050. This does not consider the economic benefits that hydrogen will have on other markets that indirectly benefit from the energy sector, such as industries that can use hydrogen to reduce their carbon emissions.

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 and off-grid locations. Coupling the benefits of an SMR that produces both heat and power with the ability to produce hydrogen, could completely transform the lives of Ontarians and help our province set its path toward a low carbon future.

Ontario is well-positioned to drive growth in a low carbon hydrogen economy, particularly given the province's low-carbon electricity supply that relies on a natural gas distribution system as well as globally renowned nuclear energy facilities that power a significant portion of the power grid.

There are several benefits and anticipated outcomes from developing Ontario's hydrogen sector, which include:

- Reducing greenhouse gas emissions.
- Generating economic development and talent.
- Promoting energy equity, security, and resilience.

- Reducing regional barriers and enabling a low carbon, clean energy future.

Key considerations

Brought forward as key pillars in Canada's Hydrogen Strategy, U-Battery strongly believes that the following considerations will be key in developing Ontario's hydrogen sector:

- Developing strategic partnerships that encourage and enable intergovernmental, public-private, and global collaboration.
- Cost sharing and de-risking of investments through government funding programs and innovative business models that private-public collaboration.
- Facilitating, encouraging, and supporting innovation and collaboration between industries to get the best out of Ontario's burgeoning technology and energy sectors.
- Establishing and modernizing codes and standards while removing red tape.
- Establishing enabling policies and regulatory frameworks.
- Driving public awareness on the safety, uses and benefits of hydrogen.
- Ensuring that hydrogen production is a key component of forward-looking regional economic development and strategic energy development plans.
- Engaging foreign allies and partners early to enable global collaboration.

Leveraging the intangibles of low carbon nuclear for hydrogen production

Ontario is home to one of the world's most advanced nuclear energy sectors and there is a real opportunity to harness its intangibles toward developing a sustainable hydrogen sector. Nuclear energy operations can be leveraged to produce hydrogen at a low carbon capacity, and there is an undoubted synergy between the two, particularly as part of Canada's carbon mitigation strategy and energy transformation efforts. Further, it is important to consider that nuclear is one of today's safest methods of energy production due to the rigorous safety standards governing the sector, all of which would be subsequently applied to any nuclear energy operation involved in the production of hydrogen.

Further, through the development and deployment of SMRs, which have the potential to be cost competitive with other low-cost energy production methods, the cost curve of hydrogen production could be significantly reduced. Ultimately, the culmination of hydrogen production as a value-added capability of nuclear energy development operations would enable a direct link between nuclear and renewables.

Fortifying a globally renowned talent pool

By investing in and developing a sustainable hydrogen sector, Ontario would subsequently:

- Secure the position of the province's energy supply chain in global markets.
- Fortify manufacturing, expert energy services, and made-in-Ontario jobs.
- 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 Ontario's closest interprovincial and global export allies.

Establishing enabling policies and funding

Like the development of SMRs, hydrogen production could be a clear and definitive path to Ontario's long-term economic recovery efforts in the wake of the COVID-19 pandemic. Ontario's energy supply chain has long embraced collaborating with the federal government on both SMRs and hydrogen production, as it understands the importance of regulatory compliance and collaboration on policy development. Ultimately, the success of Ontario's hydrogen strategy will be reliant on a willingness within different levels of government to collaborate with each other while strategically supplementing the efforts of the private sector around cost and risk sharing.

Ontario should consider the following when developing its Hydrogen Strategy:

- Cost-sharing during the development phase.
- Loan guarantees through the construction phase.
- Contracts for difference, power purchase agreements, or tax incentives during the operating phase.

These efforts would not only strengthen the hydrogen sector, but rather ensure its prosperity, and in turn, Ontario's long-term economic growth.

Enabling regional economic development

Deprived of key infrastructures and faced with a less dynamic employment sector than the one found in urban settings; rural and remote communities have been hit hard by the COVID-19 pandemic. Furthermore, remote communities not connected to the North American electricity grid rely on costly and GHG-emitting diesel generated electricity. In both instances, a developed hydrogen sector could provide a sustainable solution. Like SMRs, hydrogen would turn remote communities away from fossil fuel generation toward a low carbon option for heavy-industry operations, transport and community infrastructure.

Like SMRs, hydrogen holds the potential to sustain Ontario's position as a global leader in the field of sustainable energy. Ontario should remain steadfast in its commitment to develop the province's hydrogen sector at time where the mitigation of climate change has never been more of an urgency.

Conclusion

As Canada looks for industries and sectors that can accelerate its return to growth and full employment, coupling the nuclear energy development and hydrogen production will provide a reliable source of innovation, employment and sustainable growth, primed to alleviate Ontarians from the economic impact of COVID-19. U-Battery would like to thank the Ontario government for the opportunity to submit its input to the province's Low Carbon Hydrogen Strategy discussion paper.