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Small reactors could power far north mines

Study shows vSMRs could reduce emissions by 85 per cent or more

Chalk River – Very small modular reactors (vSMRs) could provide clean, economic and reliable power and heat to remote northern mines and surrounding communities, reducing or eliminating reliance on diesel, according to a recent study completed by Ontario Power Generation (OPG), Canadian Nuclear Laboratories (CNL), and Mining Innovation, Rehabilitation, and Applied Research Corporation (MIRARCO).

The feasibility study found that the most economical energy mix was for vSMRs to provide 90 per cent of the baseload power required for mining operations and associated uses, with only peak demand periods managed through use of diesel generation, reducing emissions by 85 per cent. Emissions could be lowered further by adding other renewables to the mix, decreasing the diesel component, at a slightly increased cost.

Advantages of a vSMR, producing less than 10 megawatts of power, include:

- Their small size, making them easier to transport and install in remote communities, and scalable to meet changing needs;
- Their ability to safely, reliably produce power;
- Long operating life without the need for an onsite inventory of fuel; and,
- Short installation period due to their modular construction and factory fabrication.

Global First Power, a joint venture between OPG and USNC-Power, is the most advanced vSMR project in Canada. The project recently received Canadian Nuclear Safety Commission (CNSC) approval to begin a technical review. Subject to federal government financial support, the next step in the process is to construct a demonstration vSMR at CNL's Chalk River campus.

This demonstration project will serve as a model for future SMR deployments as called for in Canada's SMR Roadmap and Action Plan, by producing competitively-priced clean energy ideally sized for remote communities and heavy industry such as mining and resource projects.

Quick Facts

- Nuclear technology, including SMRs, will play a key role in meeting federal and provincial climate change and GHG reduction goals.
- SMRs are defined as producing up to 300 MW of power, while vSMRs produce up to 10 MWs of power per module.
- Small modular reactors are more flexible than conventional reactors, better enabling them to work within a diverse energy grid alongside intermittent technologies such as solar or wind. They can also be used for applications like process heat or hydrogen production, which help enable further industrial sector decarbonisation.
- Global First Power's project is the most advanced SMR project in Canada.
- In 2018, CNL launched an invitation process, inviting SMR vendors to indicate their interest in siting a demonstration reactor at a CNL-managed site. There are currently four projects in various stages of this process.

- There are 10 off-grid operating mines in Canada. Most are served by diesel generators, which offer reliable, fast-acting, easy-to-vary output but are greenhouse gas (GHG) emitting.

Quotes

“Nuclear power and SMRs play an enormous and critical role in meeting Canada’s climate change goals,” said Robin Manley, Vice-President of New Nuclear Development at OPG. “This study demonstrates that not only can a vSMR dramatically reduce emissions in an industry that currently relies heavily on diesel, but it can do it in a cost-effective way.”

"This study paves the way for the future of mining: not only does it show that vSMRs could provide a cost-effective and reliable energy source, it demonstrates that vSMRs are a long-term solution that can help diversify and intensify a mining operation while also providing a surplus that will benefit Communities in the area,” said François Caron Director of the Energy Center and Bruce Power Chair for Sustainable Energy Solutions, MIRARCO, Mining Innovation.

“Small modular reactors hold great potential in helping not just the mining sector, but Canada, move closer to a low-carbon future,” said Dr. Jeff Griffin, Vice-President, Research & Development, Canadian Nuclear Laboratories. **“**CNL, through the SMR invitation and siting process, coupled with the world-class research and development conducted at the laboratories, is working to unlock that potential.”

“This study clearly demonstrates the incredible potential of vSMR technology,” said Greg Rickford, Minister of Energy, Northern Development and Mines. “vSMRs have the potential to change the game and further reduce GHG emissions in the mining sector and beyond. I am excited by these results and hopeful that this technology can play a meaningful role in providing affordable, clean energy in the future.”

About OPG

As a global climate change leader and the largest, most diverse electricity generator in the province, OPG and its family of companies are helping lead the charge to a post-carbon economy.

About CNL

Canadian Nuclear Laboratories is a world leader in nuclear science and technology offering unique capabilities and solutions across a wide range of industries. Actively involved with industry-driven research and development in nuclear, transportation, clean technology, energy, defence, security and life sciences, we provide solutions to keep these sectors competitive internationally.

About MIRARCO, Mining Innovation

MIRARCO, or Mining Innovation, Rehabilitation, and Applied Research Corporation, has been providing innovative solutions for mining industry challenges since our inception in 1998. We are a not-for-profit research arm of Laurentian University, Canada’s Mining University. Our team of talented academic and industry professionals offers expertise for applied research in: Rock Mechanics, Safety, Decision Support Software, and Energy.

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