canadian nuclear association

Emission and Economic Implications for Canada of Using Small Modular Reactors (SMRs) in Heavy Industry

Research conducted by EnviroEconomics and Navius Research studied the economic and climate implications of employing small modular reactors (SMRs) in Canada's high-emitting industrial sectors.

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Executive Summary

Much of the focus on SMRs has been on their ability to supply clean electricity into the grid. But, of equal importance is their potential to decarbonize heat and power in Canada's industrial sectors. Oil sands, chemical manufacturing and mining currently contribute more than 30 per cent of Canada's greenhouse gas emissions and face enormous challenges in reducing them.

SMRs are particularly well-suited for these sectors given their ability to generate reliable, carbon-free electricity, and heat, with a much smaller land footprint than current reactors. These SMRs are often factory-constructed and modular, which means they are easily transported to remote or challenging locations.

The model used by EnviroEconomics and Navius Research, which has been leveraged by several organizations including the Canadian Institute for Climate Choices and the International Council on Clean Transportation, explored a variety of cost and technical assumptions for deploying SMRs, which are currently in the research and development phase.

Across all scenarios, SMRs delivered low-cost emission reductions, driving down the cost of getting to net-zero as a nation. With deployments set to begin as early as 2026, SMRs could be widespread by 2035 as the demand increases rapidly for reductions in the industrial sector.

HIGHLIGHTS OF THE DATA

- Between 2035-2050, SMRs could reduce GHG emissions by 216 megatonnes (Mt)* in the heavy industrial sector (Canada-wide emissions are approximately 700 Mt per year). That is the equivalent of removing all current emissions from the oil and gas sector for a one-year period** or taking more than three million cars off the road each year in Canada.

- Beyond their value in cutting GHG emissions in the Heavy Industrial Sector by 18 per cent by 2050, SMRs could lower the country's cost of reaching net zero by more than five per cent and contribute up to $5 billion to GDP annually by 2050. This economic benefit comes from balance sheet savings for industry, with SMRs in some applications less expensive than alternatives.

- The introduction of SMRs to the industrial sector means that other technologies being considered - hydrogen, carbon capture utilization and storage and renewable natural gas - which are widely needed and scarce, could be deployed elsewhere, potentially reducing GHG emissions and expenditures even further.

** Megatonnes - Standard measure for GHG reduction.*
*** Sourced from Government of Canada GHG Emissions*

Key Results

01

SMRs could lower the country's cost of reaching net zero by more than five per cent and contribute $5 billion to GDP per year by 2050, versus a scenario where SMRs aren't available.

02

SMRs could contribute to getting to net zero by reducing GHG emissions by **14 Mt** per year on average, the equivalent of taking over 3 million cars off the road per year.

03

Between 2035 and 2050, SMRs could reduce GHG emissions by **216 Mt in the industrial sector, which is more than the yearly GHG emissions created by all types of transportation across Canada.**

04

The deployment of SMRs will reduce the cost for the pathway to NetZero 2050 in large industry. When comparing GHG reducing technologies, **SMRs provide a lower cost option for industry versus technologies like hydrogen, carbon capture utilization and storage, renewable natural gas, and other approaches.** Additionally, by adding SMRs to large industry, reducing Canada's overall GHG emissions can be done for a cheaper cost than if SMRs were not available.

05

By using SMRs as a GHG reduction method in large industry, **SMRs can displace the need for hydrogen and renewable natural gas technologies to decarbonize this industry.** Instead, these displaced technologies can be used to reduce GHG emissions cheaper and easier in other industrial, household and transport heat and power applications.

06

Across the range of the cost and technical feasibility assumptions tested, **SMRs continued to deliver low-cost emission reductions.**

07

The modelling demonstrated SMRs will become very important after 2035 as more reductions from the industrial sector are needed to achieve net zero, as most other sectors will be abating heavily by this point and industry will need to catch up.

Note: The modelling assumed that the Liberals' announced carbon price of 170$/tonne is the price input in the early 2030's, coinciding with the introduction of SMRs and that that price triggers significant SMR adoption that accelerates after that point as carbon pricing rises under various scenarios.

Please find the complete study at this link.