The Conference Board of Canada

A New Power

Economic Impacts of Small Modular Nuclear Reactors in Electricity Grids

Zero-emissions, non-intermittent, cost-competitive electricity. As Canada electrifies, the potential of small modular nuclear reactors (SMRs) to deliver these attributes is gaining steam.

Seeking dividends

Ontario, Saskatchewan, New Brunswick, and Alberta have committed to a memorandum of understanding to develop and deploy SMRs in Canada. While their motivations differ, transitioning their electricity markets toward carbon neutrality is a common theme. But in the wake of a deep recession, this transition has to make economic sense—and yield dividends.

What's the economic potential?

We estimated the economic impact of deploying SMRs in Ontario and Saskatchewan from 2021 onward.[1] We assumed that in Ontario, a single 300-megawatt electrical unit reactor will operate for 60 years, starting in 2028. A fleet of four SMRs—identical to the Ontario design—will become incrementally operational in Saskatchewan from 2032 to 2041. The economic impacts[2] include:

Ontario

- The SMR can generate $2.6 billion in GDP, $1.7 billion in wages, and $873 million in taxes for Ontario's economy. (See Chart 1.)
- The SMR's operation phase accounts for 49 per cent of the GDP generated in Ontario. The manufacturing and construction phase accounts for 45 per cent. Project development and decommissioning account for 6 per cent.
- For every dollar of direct GDP generated by the SMR, Ontario gets $1.04 in indirect and induced impacts. For Canada as a whole, the indirect and induced impacts amount to $1.99.
- Every dollar of SMR project expenditure translates into $0.68 of GDP in Ontario and $0.81 of GDP in Canada.
- On average, SMR manufacturing and construction adds 1,604 Ontario jobs per year. Canada benefits from 1,939 jobs per year during the same phase.
- The operation phase adds 210 jobs per year on average for Ontario. The total for Canada is 296 jobs per year.
- On average, the project development and decommissioning phases add 684 and 163 jobs per year, respectively, in Ontario. The total for Canada is 742 and 183 jobs per year.
- Considering its 60-year time frame, SMR operations account for most of the new jobs. Manufacturing and construction are responsible for the highest rate of job creation per year.

Saskatchewan

- We estimate the following GDP contributions from the SMR fleet deployment: Stage 1, 2021–32: $1.6 billion; Stage 2, 2033–42: $2.8 billion; Stage 3, 2043–2104: $4.4 billion.
- In aggregate, the deployment can yield $8.8 billion in GDP, $5.6 billion in wages, and $2.9 billion in taxes for the province. (See Chart 2.)
- The SMRs' operation phase accounts for 54 per cent of the GDP contribution generated in Saskatchewan. The manufacturing and construction phase accounts for 36 per cent. Project development and decommissioning account for 10 per cent.
- For every dollar of direct GDP generated by the SMRs, Saskatchewan gets $0.93 in indirect and induced impacts. For Canada, the indirect and induced impacts amount to $1.83.
- Every dollar of SMR project expenditure translates to $0.64 of GDP in Saskatchewan and $1.02 of GDP in Canada.
- On average, SMR manufacturing and construction adds 7,042 jobs per year from the Saskatchewan fleet. Canada benefits from 10,516 jobs per year during the same phase.
- The operation phase creates 728 jobs per year on average for Saskatchewan's economy. The total for Canada is 1,173 jobs per year.
- On average, the project development and decommissioning phases add 718 and 833 jobs per year, respectively, in Saskatchewan. The total for Canada is 786 and 1,015 jobs per year.
- The SMR fleet operation accounts for most of the new jobs. Manufacturing and construction are responsible for the highest rate of job creation per year.

1 All timelines indicated are based on assumptions. The year 2021 is an assumed start date for SMR deployment activities, which include in sequential order: project development, manufacturing and construction, operation, and decommissioning phases.

2 All economic impact data cited are based on The Conference Board of Canada's input-output economic model. See Methodology for more details.

Strategic issues

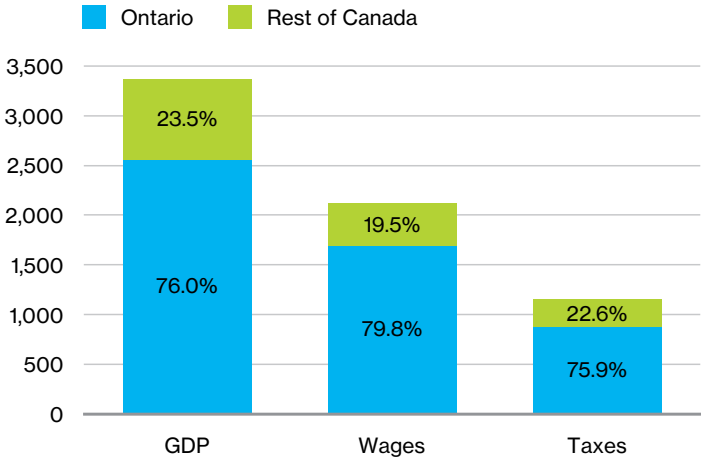
When it comes to SMRs, Canada is building from a position of strength. Our world-renowned nuclear industry and unparalleled uranium resource quality afford several advantages. But there are also some challenges:

- **Financing:** From concept to commercialization, SMRs require about a billion dollars of development expenditure. This risky pre-commercial phase needs public capital, but governments will be reluctant without major private capital commitment. Financial risk-sharing will be important.
- **SMR deployment strategy:** Deploying multiple SMR technologies in Canada with differing supply chains—as well as regulatory and operational know-how—could be problematic. It might limit economies of scale and the specialization needed to drive down costs.
- **Uncertain costs:** As an emerging technology, costs are still uncertain. It will be crucial to drive down costs rapidly as deployment unfolds.
- **Radioactive waste management:** SMRs produce radioactive waste. Stakeholders will need to fully understand and support a sustainable, long-term plan to manage this waste. The industry's long-term prospects depend on it.
- **International competition:** The size of the global export market exceeds Canada's domestic market tenfold.[3] Canada will need to compete in a market currently dominated by state-owned enterprises in Russia and China. Given our private-sector-driven SMR industry, we may have to rely on international partnerships for success.

Chart 1

At least 75 per cent of economic benefits remain in Ontario

($ millions; share of benefits)

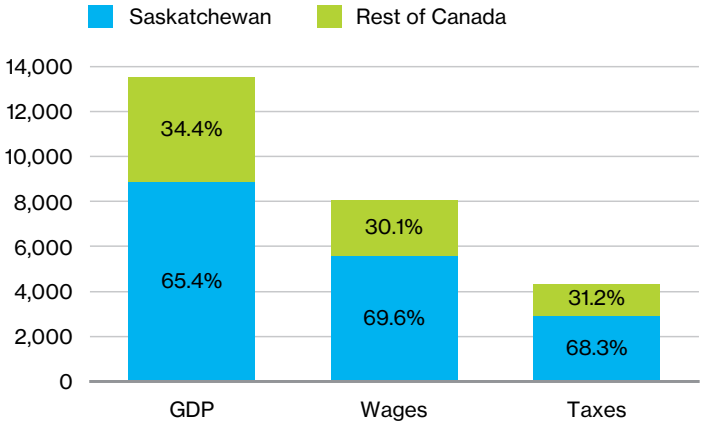


Note: Percentage totals may not add to 100 due to rounding.
Source: The Conference Board of Canada.

Chart 2

At least 65 per cent of economic benefits remain in Saskatchewan

($ millions; share of benefits)



Note: Percentage totals may not add to 100 due to rounding.
Source: The Conference Board of Canada.

3 Canadian Small Modular Reactor Roadmap Steering Committee, *A Call to Action.*