Why AI needs nuclear

The power of clean energy in Canada's data-driven future

NEXUS

BRUCE POWER RESEARCH CENTRE

Nearly daily, stories, articles and government strategies on the energy intensity of data centres and artificial intelligence enter our newsfeeds. Some recent headlines: "AI Data Centers Are Massive, Energy-Hungry and Headed Your Way," "Inside the AI race: can data centres ever truly be green?" and the answer that is seemingly everywhere: "Data Centers Turn to Nuclear for AI Energy Demands."

Demand for data centres in Canada and around the world is on a rapid growth trajectory, fueled by the surge of cloud services and technological innovations. And this demand for data centres brings with it massive energy needs—requiring clean, reliable power. But it also underscores the importance of energy independence and information sovereignty, building and operating these facilities on Canadian soil and securing access to the made-in-Canada electricity they depend on.

Nuclear power is uniquely poised to meet this need, with Bruce Power and the work that happens in the Clean Energy Frontier region of Bruce, Grey and Huron counties at the forefront of Ontario's solution.

Data centres around the world

In 2023, data centres in the United States consumed about 176 terawatt-hours (TWh) of electricity. This is enough energy to power all US households for about 1.5 months. This demand for powering data centres is only growing. With 60% of power coming from natural gas or coal in the US, data centres currently are largely being powered by high-emission electricity sources.

Companies know that won't work long term. That's why leaders like Microsoft and Google are turning to nuclear—signing partnerships to power their data centres with clean, reliable energy. They understand that nuclear energy isn't just an option—it's a necessity to power the future of digital infrastructure.

Similarly, by 2035, European data centre power demand is expected to rise to 236 TWh. The largest western European data centre markets—Germany, France and the United Kingdom—are expected to see the highest levels of data centre power demand over the next 10 years.

But are they ready? In Germany and the UK, over 50% of their power comes from non-emitting sources; however, a heavy reliance on renewables may result in unreliable and intermittent energy supply. France is in the best position to support its growth in data centres, with nearly 70% of their power coming from nuclear.

Data centres here at home

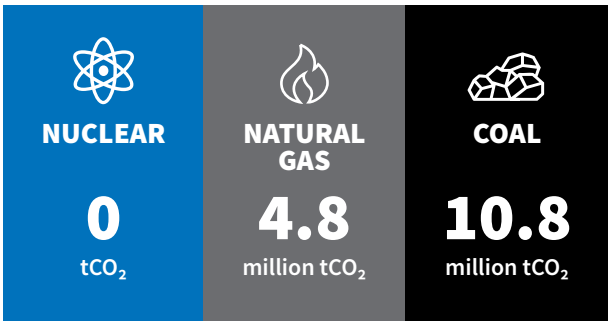
The Government of Canda is committed to building domestic capacity at home—providing up to $700 million to support projects from industry, academia and the private sector to build Canadian AI data centres and up to $1 billion allocated to building large supercomputing infrastructure and smaller secure computing facilities on Canadian soil. Data sovereignty in Canada is a priority, and it won't happen without nuclear.

In Ontario, the government launched its first Integrated Energy Plan, which sets out a roadmap for meeting the province's electricity needs through 2050. This plan emphasizes attracting digital infrastructure while maintaining a clean grid—but additional nuclear capacity is a necessity.

Clean energy matters

The volume of energy needed to power data centres is too high to rely on carbon-emitting sources of power. If Canada's current data centre market of 1.37 thousand MWs is running continuously for one year, it uses about 12 TWh of electricity.

If this 12 TWh of electricity is only supplied by one source, however, it would emit:



Assumptions: coal-heavy grid: ~900 g CO_2/kWh (0.9 t/MWh); natural gas-heavy grid: ~400 g CO_2/kWh (0.4 t/MWh)

Bruce Power and the Clean Energy Frontier region: poised for success

Bruce Power currently generates about 30% of Ontario's electricity with plans to increase site capacity upwards of 7,000 MW through the 2030s—equivalent to adding a large-scale reactor to its site with current infrastructure. In addition, the Ontario government's commitment to adding more nuclear to the grid means an additional 4,800 MW of new nuclear capacity—the proposed Bruce C project—at the existing Bruce Power site.

The Protect Ontario by Securing Affordable Energy for Generations Act (2025) prioritizes projects that support energy sovereignty as well as economic development. Construction of a 48-MW data centre in the Clean Energy Frontier region, for example, would create and support $484 million in provincial GDP, $311 million in labour income, and 3,785 jobs—with construction generating an estimated $162 million in taxes to municipal, provincial and federal levels.

Bruce Power and the Clean Energy Frontier region are set up to serve the Government of Canada's vision, the Government of Ontario's long-term plan, and the data centre industry itself, into the next generation—ensuring data sovereignty, energy independence and economic resiliency.

We're ready because...

- **We meet data's reliability requirements.** Data centres must operate 24/7 to ensure that digital services always remain available. Nuclear power plants are among the most reliable sources of electricity generation, making them an ideal energy source.
- **We have existing high-capacity transmission and ease of grid integration.** The Bruce Power site has high-capacity transmission lines that deliver baseload power to Ontario. Data centres cannot be located where there are unreliable energy sources.
- **We can help keep data safe.** Locating data centres in strategic areas near the Bruce Power plant will help to keep data close to home and support Canada's data sovereignty.
- **We can keep costs down.** By co-locating data centres and nuclear power plants, efficiencies and cost savings can be found for investors and ratepayers. Co-locating a data centre with nuclear plants complement existing safety enhancements—fire prevention and protection, enhanced security and emergency management systems, access to 24/7 medical assistance and necessary cooling. Co-location may also reduce transmission losses by situating demand near supply.

Conclusion

If Canada wants to attract and sustain investment in data centre growth, the right grid conditions are non-negotiable—and nuclear power is central to making that happen. Building new facilities in the Clean Energy Frontier region—with its robust nuclear assets and innovation-ready communities—means pairing data centre expansion with continued life extension work at existing nuclear stations as well as policies that enable new nuclear buildout.

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