

ARTIFICIAL INTELLIGENCE, ENERGY AND CLIMATE CHANGE

Artificial intelligence (AI) is rapidly spreading in Canadian workplaces, with few laws or regulations, and little testing. New technologies can have positive and negative impacts on our society. The harmful effects of AI for Canada's energy infrastructure and the environment could outweigh any benefits we gain from these new tools. There is a responsible way to use AI as a tool in workplaces, but it will require new laws, public ownership and transparency.

This backgrounder looks at AI's energy use, its environmental impacts, the private sector's role in accelerating these impacts, and what we can do to address them.

The climate crisis and Canada's electricity infrastructure

Canada is warming twice as fast¹ as the global average, and the north is warming even faster, driving climate-fueled natural disasters and extreme weather. Heat waves are getting longer and more severe, putting people's health at risk. For example, the 2021 heat dome in BC caused an estimated 619 heat-related deaths.² The last few years have been some of Canada's worst wildfire seasons on record,³ forcing hundreds of thousands of people to flee their homes and blanketing communities in smoke hundreds of kilometers away.

In 2024 insurance firms paid out \$8.5 billion in damages from severe weather events, including wildfires, floods, hailstorms and hurricanes.⁴ Yet Canada's progress to reduce greenhouse gas emissions has stalled⁵ and our country is not on track to meet its climate targets.

¹ Environment Canada (2019, April 19). *Canada's climate is warming twice as fast as global average*. Government of Canada. <https://www.canada.ca/en/environment-climate-change/news/2019/04/canadas-climate-is-warming-twice-as-fast-as-global-average.html>

² Extreme heat events are public health emergencies. *BCMJA Doctors of BC Publication*, 63(BCMJ). <https://bcmj.org/bccdc/extreme-heat-events-are-public-health-emergencies>

³ Jones, A.M. (2025, August 12). *This is our second-worst wildfire season on record-and could be the new normal*. CBC News. <https://www.cbc.ca/news/climate/wildfire-season-2025-1.7606371>

⁴ Weltman, B. (2025, January 13). *2024 shatters record for costliest year for severe weather-related losses in Canadian history at \$8.5 billion*. Insurance Bureau of Canada. <https://www.ibc.ca/news-insights/news/2024-shatters-record-for-costliest-year-for-severe-weather-related-losses-in-canadian-history-at-8-5-billion>

⁵ (2025, September 18). *2024 emissions estimate shows progress stalled, Canada's 2030 climate target out of reach*. Canadian Climate Institute. <https://climateinstitute.ca/news/2024-emissions-estimate-shows-progress-stalled/>

Canada's aging electricity infrastructure is struggling to respond to the climate crisis. While 65.5% of Canada's electricity production comes from renewables such as solar, wind, and hydropower, that proportion has not improved since 1985.⁶ The growing use of electric vehicles and air conditioning is driving up demand for electricity. Most of our electricity transmission lines run north-south between Canada and the United States, a country that is scrapping climate change targets. The energy needs of AI infrastructure will increase the pressure on our already strained energy resources.



Measuring energy

Wattage measures how much electric power is used. A kilowatt-hour (kWh) is a measure of energy over a period of time.

For example, a 100-watt light bulb used for 10 hours uses 1 kWh of electricity.



A kilowatt is
1,000 watts.



A megawatt is
1,000,000 watts.
1 million



A terawatt is
1,000,000,000,000
watts. **1 trillion**



Measuring greenhouse gas emissions

Carbon dioxide (CO₂) is a gas leading to global warming. We measure how much of this greenhouse gas is released into the atmosphere in tonnes.

A tonne is
2,240 pounds or
1,000 kilograms.



A megatonne is
1,000,000 kilograms.
1 million



A gigatonne is
1,000,000,000,000
kilograms. **1 trillion**



⁶ Ritchie, H., Roser, M., & Rosado, P. (n.d.) *Renewable Energy*. Our World in Data.
<https://ourworldindata.org/renewable-energy>

AI is here and spreading quickly

Workplace AI use is quickly growing. Over 12% of private businesses reported using AI in mid-2025,⁷ doubling the rates from 2024. While data on public sector AI use is not being collected, CUPE members are reporting AI use in many sectors including health care, municipalities, and energy. Prime Minister Mark Carney has hired a private corporation to roll out AI in the federal public service and has named Evan Solomon as the new AI minister overseeing the project.⁸

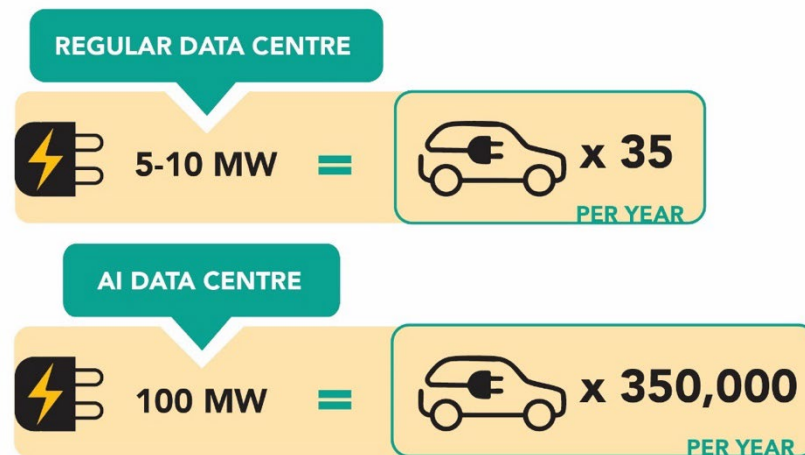
The tech sector creates the impression that AI is all “in the cloud” and doesn’t physically exist, but AI is an advanced computer. Just like your phone or your laptop cannot function without servers and hard drives that process and store data, AI relies on data centres. Growing AI use by Canadian employers will drive demand for newer, bigger data centres and the vast amounts of energy they consume.

AI has high energy needs

Data centres are large warehouses of servers that support the cloud. Canada had 239 traditional data centres as of March 2025, but AI-focused data centres need more space and power to function properly. These new AI-focused data centres demand more than 100 megawatts of energy to run, and have an annual electricity consumption equivalent to 350,000 electric vehicles’ worth of power, compared to the five to ten megawatts that traditional centres require.⁹ U.S. data centres used 200 terawatt-hours (TWh)



AI data centre energy needs

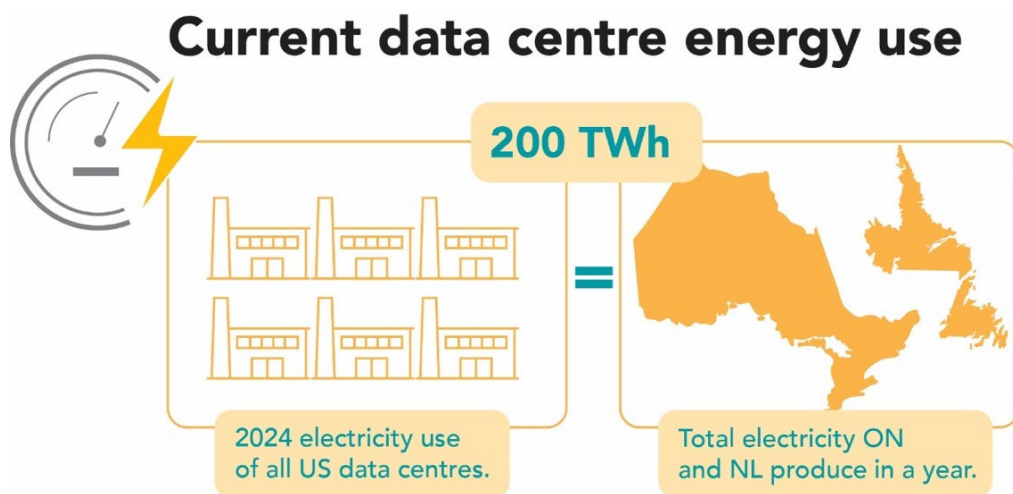


⁷ Bryan, V., Sood, S., & Johnston, C. (2025, September 11). *Analysis on expected use of artificial intelligence by businesses in Canada, third quarter of 2025*. Statistics Canada. <https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2025011-eng.htm>

⁸ Marx, P. (2025, July 24). *Mark Carney’s AI agenda is a gift to Big Tech*. The Breach. <https://breachmedia.ca/mark-carneys-ai-agenda-is-a-gift-to-big-tech/>

⁹ Harland, K. (2025, March 31). *Is there a smart way to integrate artificial intelligence data centres into Canada’s electricity grids?* Canadian Climate Institute. <https://climateinstitute.ca/smart-way-integrate-artificial-intelligence-data-centres-canada-electricity-grids/>

of electricity in 2024¹⁰ — close to the annual electricity production of Ontario and Newfoundland and Labrador combined. Hydro-Québec predicts a 4.1 terawatt-hour (TWh) surge in data centre electricity demand by 2032.¹¹ The centres also need water to cool down the servers that produce a lot of heat.



Federal and provincial governments are encouraging corporations to build data centres in Canada because of low electricity costs, high access to renewable sources and cool climate.¹² A surge in the construction of new facilities could harm power grids and drive up power rates. British Columbia and Quebec have aging hydroelectric infrastructure. The added stress from new AI data centres will likely require massive public investment in upgrades. As we move away from fossil fuels as a large share of our energy mix, the increased non-emitting electricity is welcomed, but our members and the environment must benefit from the increased demand. The rush to generate more power for AI's needs has led some corporations and governments to want to power new data centres with natural gas because it is a cheaper and faster way to get them running, but this approach disregards the environment. The recent push for investments in nuclear power is, in part, driven by AI's power needs, and it is important that nuclear development strategies are robust and benefit workers.

AI energy use is not transparent

The most popular AI tools are owned by giant private tech corporations that are not legally required to provide information about their products. The industry is unregulated, and the private sector stands to make billions of dollars.

Researchers are just starting to understand how much energy it takes to power generative AI that produces text, images or videos. Google has revealed that the median Gemini text prompt consumes

¹⁰ O'Donnell, J. & Crownhart, C. (2025, May 20). *We did the math on AI's energy footprint. Here's the story you haven't heard.* MIT Technology Review. <https://www.technologyreview.com/2025/05/20/1116327/ai-energy-usage-climate-footprint-big-tech/>

¹¹ Farahdel, S. (2025, August 8). *AI as Canada's green catalyst—but at what cost?* The Hill Times. <https://www.concordia.ca/cunews/main/items/opinions/2025/ai-as-canada-s-green-catalyst-but-at-what-cost-.html>

¹² Tayal, P. (2025, March 25). *How Canadian investors can profit from AI's growing energy needs.* The Motley Fool Canada. <https://www.fool.ca/2025/03/25/how-canadian-investors-can-profit-from-ais-growing-energy-needs/>

0.24 watt-hours, or the equivalent of running a microwave for one second.¹³ However, Google will not disclose how many text-based inquiries Gemini receives per day, saying it's proprietary information. Some researchers have tried to estimate AI's energy footprint,¹⁴ but it's almost impossible without private corporate information.

As a first step towards transparency, the federal government should introduce laws and regulations that force AI corporations to disclose their energy use, similar to requirements for corporations to disclose how much energy household appliances use.

The private sector profits, the public pays

Corporations that sell AI servers and other physical AI infrastructure have seen their investments rise,¹⁵ and 90% of Canadian businesses surveyed by KPMG want federal investment in private digital infrastructure.¹⁶ The federal government is already funding data centres through the Canadian Sovereign AI Compute Strategy, which includes \$700 million for the private sector.^{17,18}

While private corporations stand to profit from the AI revolution, Canadians will pay the price. Projects will receive government funding that could otherwise support public services. At the same time, major tech corporations will burden communities near data centres through their use of land, energy, water, and greenhouse gas emissions. In the U.S., rural and marginalized communities are most likely to feel the harmful effects of data centres.¹⁹

A more sustainable future for AI starts with public ownership. The federal government should invest in public cloud infrastructure built and maintained by the public service for public sector use. Building this infrastructure would require skilled workers for both the physical infrastructure (data centres) and the digital infrastructure (software engineers, for example). Publicly owned and managed data centres would improve Canada's economic independence from the U.S. and help protect Canadians' data.²⁰ Public ownership also helps ensure projects fulfill our environmental obligations by setting targets and tracking emissions more closely than is possible in contracts with private corporations.

¹³ Crownhart, C. (2025, August 21). *In a first, Google has released data on how much energy an AI prompt uses*. MIT Technology Review. <https://www.technologyreview.com/2025/08/21/1122288/google-gemini-ai-energy/>

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ An infrastructure wish-list from Canadian CEOs and business owners. *ReNew CANADA Magazine*.

<https://www.renewcanada.net/an-infrastructure-wish-list-from-canadian-ceos-and-business-owners/>

¹⁷ Innovation, Science and Economic Development Canada. (2025, October 31). *Canadian sovereign AI compute strategy*. Government of Canada. <https://ised-isde.canada.ca/site/ised/en/canadian-sovereign-ai-compute-strategy>

¹⁸ Castaldo, J. (2025, May 28). *Bell to open six data centres equipped to power AI models and apps in B.C.* The Globe and Mail. <https://www.theglobeandmail.com/business/article-bell-to-open-six-data-centres-equipped-to-power-ai-models-and-apps-in/>

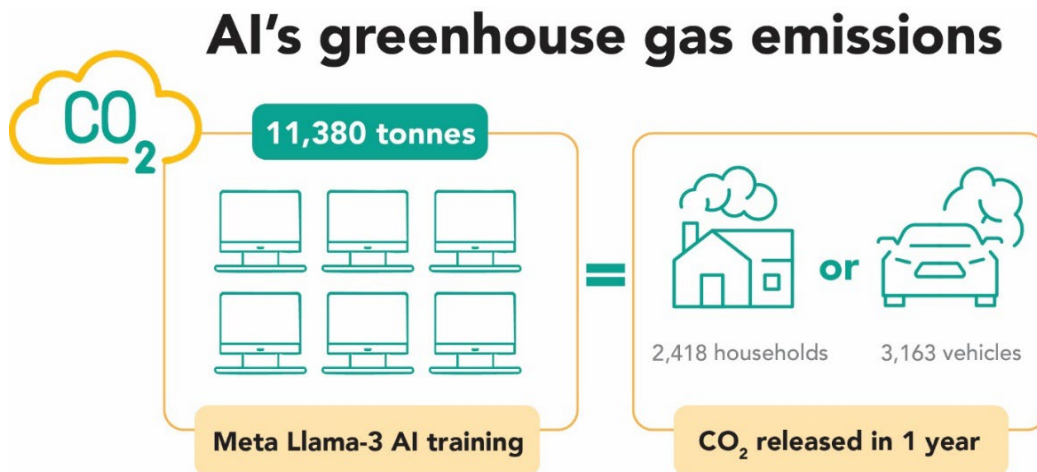
¹⁹ Kneese, T. (2025, June 5). *Why are tech oligarchs so obsessed with energy and what does that mean for democracy?* Tech Policy Press. <https://www.techpolicy.press/why-are-tech-oligarchs-so-obsessed-with-energy-and-what-does-that-mean-for-democracy/>

²⁰ Marx, P. (2025, July 8). *Canada should build public cloud infrastructure rather than relying on U.S. tech giants*. Canadian Centre for Policy Alternatives. <https://www.policyalternatives.ca/news-research/canada-should-build-public-cloud-infrastructure-rather-than-relying-on-u-s-tech-giants/>

AI harms the environment

Greenhouse gas (GHG) emissions

ChatGPT receives 2.5 billion requests per day, and each request takes energy.²¹ Meta estimates that the energy required to train their recent Llama 3 family of large language models emitted 11,380 tonnes of carbon dioxide (CO₂). This equals the yearly emissions generated by powering 2,418 Canadian homes or driving 3,163 passenger vehicles.



On a global scale, with current energy policies in place, the AI-driven rise in electricity use could add 1.7 gigatonnes in global GHG emissions by 2030.²² This would be a 3% increase from the 53.2 gigatonnes released in the atmosphere by human activity in 2024.²³

Canada's progress on reducing GHG emissions has stalled, and recent analysis by the Canadian Climate Institute shows that our 2030 emissions reduction target is now out of reach. If new data centres in Alberta are built using natural gas power as planned, the province's GHG emissions could double,²⁴ putting Canada further behind its commitment to reach net-zero emissions by 2050.

Water consumption

AI data centres need treated water to cool servers, and much of the water will be public municipal drinking water. The UN estimates that AI-related demand for water may reach between 4.2 and

²¹ (2025, July 23). *This is how many prompts users enter in ChatGPT every day*. it-daily.net. <https://www.it-daily.net/shortnews-en/this-is-how-many-prompts-users-enter-in-chatgpt-every-day>

²² Bogmans, C., Gomez-Gonzalez, P., Melina, G., & Thube, S. (2025, May 13). *AI needs more abundant power supplies to keep driving economic growth*. IMF Blog. <https://www.imf.org/en/blogs/articles/2025/05/13/ai-needs-more-abundant-power-supplies-to-keep-driving-economic-growth>

²³ The Joint Research Centre: EU Science Hub (2025, September 9). *World emissions hit record high, but the EU leads trend reversal*. European Commission. https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/world-emissions-hit-record-high-eu-leads-trend-reversal-2025-09-09_en

²⁴ Ibid.

6.6 billion cubic metres in 2027.²⁵ For comparison, Canada's potable water use for 2021 was 4.8 billion cubic metres²⁶. Two-thirds of new U.S. data centres are being built in communities with highly stressed water systems.²⁷ In Canada, at least eight AI data centres are planned, one of which will be in Nanaimo, a drought-prone area. To date, there is no broad legislation requiring data centres to install water meters, so municipalities can monitor usage. Some municipalities ask companies to install meters and make them pay based on the amount they use. That should be the norm.²⁸



AI data center water demand

1 cubic meter (m³) = 1,000 litres



Projected 2027 global
AI-related water demand



2021 treated Canadian municipal
drinking water used

Electronic waste

As AI technology scales up, it will generate higher volumes of electronic waste. Electronic waste has become one of the fastest-growing waste streams in the world, with only 22% recycled in an environmentally sound way. Many low- and middle-income countries don't have formal recycling systems. This leads to self-employed individuals manually breaking down electronic waste into parts and materials they can sell. These workers use burning, leaching and melting, which can create harmful emissions, such as lead, posing health risks for workers and communities.^{29 30}

²⁵ (2024, September 21). *Artificial intelligence (AI) end-to-end: The environmental impact of the full AI life cycle needs to be comprehensively assessed*. UN Environment Programme. <https://www.unep.org/resources/report/artificial-intelligence-ai-end-end-environmental-impact-full-ai-lifecycle-needs-be>

²⁶ (2023, November 14). *Potable water use by sector and average daily use*. Statistics Canada. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810027101>

²⁷ (n.d.) *AI, cities, and equitable climate action*. Urban Climate Leadership. <https://static1.squarespace.com/static/662fe7a3d2aa94403d829e56/t/68b075053548cd67aefefbee/1756394757792/AI%2BDialogue%2BSummary%2BJune%2B2025.pdf+V09.pdf>

²⁸ Montpetit, J., & Brend, Y. (2025, October 18). *AI-related data centres use vast amounts of water. But gauging how much is a murky business*. CBC News. <https://www.cbc.ca/news/ai-data-centre-canada-water-use-9.6939684>

²⁹ (n.d.). *The global e-waste monitor 2024*. ITU. <https://www.itu.int/en/ITU-D/Environment/Pages/Publications/The-Global-E-waste-Monitor-2024.aspx>

³⁰ (2024, October 1). *Electronic waste (e-waste)*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/electronic-waste-%28e-waste%29>

Mining minerals and rare elements

Data centres and graphics processing unit chips (GPU)³¹ need minerals and metals. The growth of AI is driving a spike in demand for these chips and creating a resource extraction race. The minerals and metals needed for these technologies are the same ones needed to transition to a low-carbon economy. The switch from gas-powered vehicles to electric vehicles is one example of the increased need for these minerals.

Rare earth elements mining has significant environmental impacts. It contaminates the air and the water, destroys ecosystems, pushes wildlife to extinction and generates GHG emissions. The race for rare minerals has led the Ontario government to issue mining permits in northern Ontario, the so-called Ring of Fire, without involving or consulting First Nations,³² trampling those nations' treaty rights.

CUPE IS CALLING FOR ACTION TO PROTECT WORKERS AND THE PLANET

The federal government should introduce and enforce environmental laws and regulations for AI technologies

This legislation must mandate sustainability, including requiring that AI technologies be powered by clean energy. Legislation must require transparency regarding energy and water use for any AI technology in Canada and could also mandate public registries to track AI energy and water use.

The federal government should invest in and develop public digital infrastructure to secure our sovereignty

Currently, all government investment in AI supports projects developed and managed by private corporations, most of them with deep ties to the U.S. The federal government should invest in the development of public cloud infrastructure, including data centres and software for public sector use.³³ Public ownership of digital infrastructure is important for Canada's economic independence from the U.S. and would protect Canadian sovereignty.

Employers should release information on AI environmental impacts

CUPE members can help address the impacts of AI in their workplaces. Workers should ask employers to evaluate and disclose the environmental impacts of any new AI technologies.

Learn more

Read CUPE's introduction to AI, get tips to bargain strong collective agreements that protect our rights and our jobs, sign up for our AI newsletter and more at cupe.ca/ai.

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³¹ Graphics processing unit chips (GPUs) are computer parts that assist in computer graphics and image processing.

³² (2025, October 12), 'We're losing control of our communities': First Nations in states of emergency as Doug Ford pushes to mine the north. Ricochet Media. <https://ricochet.media/indigenous/were-losing-control-of-our-communities-first-nations-in-states-of-emergency-as-doug-ford-pushes-to-mine-the-north/>

³³ [Ibid.](#)