Energy Greenification and a Net-Zero Industrial Transformation in Canada

Joanne Joseph, Anjali Patel and Matthew Vucic

Issue

As one of the leading global emitters of greenhouse gases, Canada must act now to move to the forefront of leading a green energy transition, adopting policies in line with achieving Canada's goals around a net-zero industrial transformation and minimizing its contributions to climate change.

Background

What is Net-Zero?

One vital pathway to achieving net-zero entails pulling as many greenhouse gas (GHG) emissions out of the atmosphere as are being put in (Canadian Climate Institute 2022). This helps to avoid the harmful effects of emissions that contribute to climate change by either switching to technologies that do not produce emissions or pulling emissions out of the atmosphere and sequestering them permanently underground.

Exactly how Canada's net-zero transition will unfold is still uncertain. However, Canada has already begun its energy "greenification" journey through a series of international and domestic commitments, such as the Net Zero Accelerator initiative, which involves reducing GHG emissions by 40-45 percent by 2030 and achieving net-zero by 2050 (Government of Canada 2023b). The Canadian Net-Zero Emissions Accountability Act ensures accountability and transparency in achieving government targets. The legislation requires public participation and independent advice to guide the Government of Canada's efforts in offsetting emissions (Government of Canada 2023a). With less than a decade left until 2030 and countries around the world racing to capture the jobs, investment and security of a low-carbon economy, Canada is laying the foundation to support an affordable, reliable, and sustainable transition to 2050 (Government of Canada 2022).

Key enabling conditions that play an important role in reducing emissions across all sectors of the economy include widespread electrification, increased use of renewable energy and alternative fuels, and the accelerated deployment of engineered CO_2 removal mechanisms, such as carbon capture, utilization and storage (CCUS) technologies. These long-term strategies are of utmost importance for Canada, as the country is warming at twice the global average (with Canada's North warming three times as fast). These effects are projected only to intensify, leading to more frequent and severe weather extremes.

Canada's Efforts to Reach Net-Zero

As a major producer, consumer and energy exporter, Canada is met with challenges and opportunities for reaching its enhanced emissions targets. Energy makes up 10 percent of Canada's GDP and is a major source of capital investment, export revenue and jobs. Moreover, Canada's highly decentralized system of government means that close coordination between federal, provincial and territorial governments is essential for a successful energy transition.

Canada has already begun its efforts to reduce emissions through the use of non-emitting sources of energy such as hydro and nuclear power. Therefore, Canada's domestic electricity supply is among the cleanest in the world, with over 80 percent of it coming from such sources. Canada is also actively advancing a number of technologies, most recently announcing additional support for carbon capture & storage (CCUS) and hydrogen and nuclear small modular reactors (SMRs), with intentions of serving as a supplier of energy and climate solutions to the world (Kucharski and Exner-Pirot 2022; NRCan 2012).

Decarbonizing energy production is central to energy transition. Clean fuels such as hydrogen, advanced biofuels, low-carbon natural gas, sustainable aviation fuel and synthetic fuels make up less than six percent of Canada's total energy supply, but between 10 percent and 51 percent of Canada's national energy demand is expected to be met with clean fuels in 2050 to reach its net-zero goal (International Energy Agency [IEA] 2022). To achieve such an ambitious target, the Government of Canada has introduced a number of measures that support the production of clean fuel industries, such as the Clean Fuel Fund and the Hydrogen Strategy for Canada. Ensuring these initiatives and technological advancements are employed via Canada's vast network of trading partners (other areas where Canadian companies drill for oil) will ensure that these changes meet energy goals.

In a post-COVID world, Canada has also shown its commitment to pandemic recovery efforts with its climate ambitions by developing green stimulus measures, targeting areas such as upstream emissions, clean energy infrastructure, buildings efficiency and zero-emission vehicles. The last three budgets in 2021, 2022 and 2023 reflect this in highlighting new clean energy investment tax credits, CDN$3 billion in funds for direct clean electricity spending, electric vehicle infrastructure investments and CCUS funding (Andrew, Majerbi and Rhodes 2022). The implementation and use of more affordable technological practices can help achieve maximum macroeconomic and employment impact while also maneuvering the energy system in a more sustainable direction (International Institute for Sustainable Development 2023). Canada's "Strengthened Climate Plan," aimed at meeting and exceeding Canada's emissions targets under the Paris Agreement and achieving net-zero by 2050, will also be central to the government's goal of creating one million jobs and restoring employment to pre-pandemic levels (Natural Resources Canada 2023).

Additionally, accelerating the transition towards a green future requires recognizing Canada's strengths and acknowledging its weaknesses.

Canada's Strengths

- **Utilizing oil and gas experience** — Amid volatile oil prices and the effects of the COVID-19 pandemic, the federal government has made "green energy" a strategic priority. Canada holds a unique comparative advantage in oil and gas production, which in the long run will ensure Canada's place as a reliable supplier of renewable energy (IEA 2022). The oil and gas industry has the skill, institutional resources, know-how and industrial capacity to help pave a path forward for decades of clean, renewable energy. Canadian start-ups are leveraging their oil and gas drilling experience, demonstrating potential for the development of geothermal energy and the opportunity to attract international attention and investment.
- **Resource hub** — Western Canada has vast potential for fostering a green transition. With the large availability of subsurface data from oil and gas exploration and development, the economy is equipped with an extraordinary ability and knowledge to understand and map the potential of geothermal energy. Furthermore, Canada is at an advantage with readily available drilling equipment at costs significantly lower than in many economies worldwide. For instance, the Yukon Territory or the Intermontane Basins in British Columbia have the potential to co-produce oil and gas activities alongside geothermal energy through the implementation of new technologies to develop the area (Trudeau 2021a).
- **Nuclear and SMRs** — Nuclear energy in Canada is a strategic asset. Canada is a "Tier 1" nuclear nation with a full-spectrum industry that is leveraged for significant economic, geopolitical, and social and environmental benefits. Canada can anchor jobs, intellectual property and supply chains to deliver on our climate change and clean energy commitments while enabling constructive dialogue with Indigenous communities on remote energy issues. The SMRs

in Canada can be used to meet the different energy demands for on-grid, heavy industries such as mining, and remote communities. SMR can enhance competitiveness in the mining sector as a lower-cost source of low-carbon heat and power in remote frontier areas. It also promotes unlocking regional growth opportunities through advanced manufacturing and nuclear supply chain services. Building on decades of experience in supporting and deploying supply chain and national laboratories primed for growth, Canada is one of the few countries with capabilities that cover the full nuclear lifecycle from mining to plant construction to operation to waste management (Canadian Small Modular Reactor Roadmap Steering Committee 2018).

Canada's Challenges

- As mentioned, Canada has the potential to tap into potential resources to develop geothermal energy capacity. However, there is no **centralized strategy within the federal government**. A whole-of-government approach is required to work across departments and agencies to implement a coordinated response to a complex issue like climate change and accelerate the transition to a "green future." Additionally, under the purview of Environment and Climate Change Canada, climate policy is on "the doorstep of many different departments" — from agriculture to transport to natural resources and infrastructure (Trudeau 2021). Departments and agencies need to support and work collaboratively towards common climate goals by addressing specific issues or sectors of the green transition (Ghori 2022).
- Canada **risks falling behind in new frontiers** and losing out on the important economic opportunities — on innovation, development and implementation — that will arise through the green transition. If the economy lags in implementing green technologies, it might be impossible to catch up or to effectively capitalize on new technologies. Therefore, since the green transition is in Canada's economic, international affairs and individual-level interests, it would be a major disadvantage to the future well-being of the economy not to take part in energy greenification.

Other Key Players

- As of April 2020, industry groups from both the oil and gas and geothermal sectors have created an alliance to promote the development of renewable technologies in Canada. Players such as Clean Energy Canada, the Canadian Association of Oilwell Drilling Contractors and Geothermal Canada (in alliance with oil and drilling companies like Beaver Drilling and Terrapin Geothermics) hope to create opportunities for clean energy sector jobs and the development of renewable technologies in Canada (Trudeau 2021b).
- The UN Framework Convention on Climate Change (UNFCCC) and Canada's "Just Transition" can support a green transition through the conversion of hydrocarbon infrastructure and the development of local clean energy projects.
- Canadian start-ups — a research centre in Ottawa, CanmetENERGY, and the Deep Earth Energy Production Corp. in Saskatchewan — reveal how Canada leverages existing skills in research and expertise in oil and gas, mainly drilling techniques, to attract international attention and demonstrate the potential for development of geothermal energy.
- Collaboration between the Minister of International Trade, Export Promotion, Small Businesses and Economic Development and Ministry of Environment and Climate Change will be important to continue Canada's leadership on the global effort to phase out mining of thermal coal and coal-power electricity (Trudeau 2021a).

Recommendations

Focus on swift, centralized action. In Canada, the mindset of producing the last and cleanest barrel of oil is a common one among industry and government heads alike. However, first-mover status on energy greenification would yield huge benefits for Canada to not only attract an incoming wave of foreign investment and innovation within green energy, but also to encourage other fossil fuel-based economies to similarly make the leap towards energy greenification. GAC should pursue meaningful leadership and bold commitments within multilateral fora (such as the UNFCCC) while maintaining strong partnerships with provinces in order for Canada to become the world's first leading energy superpower on energy greenification and assume all of the benefits therein (Trudeau 2021b).

Wield federal capacity for procurement and investment. The purchasing power in government procurement processes is a useful tool that should be harnessed to a greater effect with regard to directly supporting technologies and businesses with the greatest potential for emissions reductions. Furthermore, Canada's attitude on tax breaks and credits to these businesses is currently extremely successful and should continue to be improved — transitioning to green technology is a matter of existential importance, so dismantling all financial barriers is of utmost importance (i.e., with initiatives like the Accelerated Investment Incentive being an effective framework for future barrier reduction). Finally, procurement should not only move towards greenification, but also away from carbon-intensive technology — implementing strong guidelines on existing carbon-heavy procurement within construction, transportation and utility industries is one step toward forcing an all-encompassing shift within the Canadian economy.

Standards-setting in natural resource extraction. Given that Canada is on the path to becoming a major supplier of critical minerals within a global push toward energy greenification, the federal government/Foreign Affairs has the power to unilaterally create stricter regulations without driving away business to other places that will use worse environmental regulations to extract these resources for a smaller price (Natural Resources Canada 2021). This is the opportunity to create an international reputation for sustainability (especially among allies within the larger trend of "friendshoring") (Freeland 2022), and to capitalize on the current trends to implement long-needed strict regulations on extractive industries domestically (Church 2020). Energy greenification takes place within a larger movement for environmental safety/well-being — as such, Canada must do its part in ensuring that the entire process of greenification creates a safer environment for all (beyond simply emissions reductions).

Capitalize on knowledge in natural resources. Canada has a wealth of international institutional power and knowledge in natural resource industries, largely in Western provinces that might find themselves disadvantaged by anti-oil/gas energy policies. This is a strength that should be capitalized on in order to offset any potential negative sentiments that arise as a result of greenification — carbon-heavy corporations and industries must be supported and pushed Foreign Affairs and NRCan in a mass retooling and transition to applicable/similar green energy fields — i.e., with oil and gas drilling being supported in a transition to greater geothermal capacity (Office of Energy Efficiency & Renewable Energy n.d.). Similarly, Canada's tech industry should be supported with additional incentives for deployment of impactful technologies (especially in transportation — to match programs like those of the United States) to move the transition most effectively and quickly (Alternative Fuels Data Center 2022).

About the Authors

Matthew Vucic is a student in the University of Waterloo's Master of Arts in Global Governance program, based at the Balsillie School of International Affairs.

Anjali Patel is a student in the University of Waterloo's Master of Arts in Global Governance program, based at the Balsillie School of International Affairs.

Joanne Joseph is a student in Wilfrid Laurier University's Master of International Public Policy program, based at the Balsillie School of International Affairs.

Acknowledgements

The authors would like to thank Professor Jatin Nathwani, PhD candidate Sarah Norton, Dr. Paul Samson and officials at Global Affairs Canada for their guidance and mentorship throughout the fellowship program.

Works Cited

Alternative Fuels Data Center. 2022. "Electric Vehicle (EV) and Fuel Cell Electric Vehicle (FCEV) Tax Credit." https://afdc.energy.gov/laws/409.

Andrew, Kevin, Basma Majerbi andEkaterina Rhodes. 2022. "What the 2022 federal budget says about Canada's commitment to a green recovery." *The Conversation*. April 8. https://theconversation.com/what-the-2022-federal-budget-says-about-canadas-commitment-to-a-green-recovery-180453.

Canadian Climate Institute. 2022. "Canada's Net Zero Future." July 27. https://climateinstitute.ca/reports/canadas-net-zero-future/.

Church, C. 2020. "Sustainable by 2045: Three ways the mining industry can make it happen." International Institute for Sustainable Development. March 3. www.iisd.org/articles/insight/sustainable-2045-three-ways-mining-industry-can-make-it-happen.

Freeland, C. 2022. Remarks by the Deputy Prime Minister at the Brookings Institution in Washington, DC. October 11. https://deputypm.canada.ca/en/news/speeches/2022/10/11/remarks-deputy-prime-minister-brookings-institution-washington-dc.

Ghori, A. 2022. "Canada needs a whole-of-government approach to climate change. How do we get there?" Canadian Climate Institute blog. March 2. https://climateinstitute.ca/canada-needs-a-whole-of-government-approach-to-climate-change-how-do-we-get-there/.

Government of Canada. 2022. "Exploring Approaches for Canada's Transition to Net-Zero Emissions 1–67." Ottawa, ON.

———. 2023a. *Net-Zero Emissions by 2050*. Canada.ca. January 27. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html.

——. 2023b. "Net Zero Accelerator Initiative." Innovation, Science and Economic Development Canada. May 12. https://ised-isde.canada.ca/site/strategic-innovation-fund/en/net-zero-accelerator-initiative.

IEA. 2022. "Canada's bold policies and support for innovation can underpin a successful energy transition, new IEA Policy Review says - news." January 1. www.iea.org/news/canada-s-bold-policies-and-support-for-innovation-can-underpin-a-successful-energy-transition-new-iea-policy-review-says.

International Institute for Sustainable Development. 2023. "Canada commits to historic investments in clean electricity and fresh water in Budget 2023, but leaves loopholes for fossil fuels." March 28. www.iisd.org/articles/statement/canada-budget-2023.

Kucharski, J., and Exner-Pirot, H. 2022. "Reimagining Canada's Role in Global Energy Security." The MacDonald-Laurier Institute. https://macdonaldlaurier.ca/wp-content/uploads/2022/03/Mar2022_Reimagining_Canadas_Role_in_Global_Energy_Security_Kucharski_Exner-Pirot_PAPER_FWeb.pdf.

Natural Resources Canada. 2021. "Joint Statement by Canada's Minister of Natural Resources and the European Commissioner for Internal Market." July 19. www.canada.ca/en/natural-resources-canada/news/2021/07/joint-statement-by-canadas-minister-of-natural-resources-and-the-european-commissioner-for-internal-market.html.

Natural Resources Canada. 2023. "Government of Canada releases interim Sustainable Jobs Plan to enable the creation of good, middle class jobs across Canada." February 17. www.canada.ca/en/natural-resources-canada/news/2023/02/government-of-canada-releases-interim-sustainable-jobs-plan-to-enable-the-creation-of-good-middle-class-jobs-across-canada.html.

NRCan. 2012. "Canada as a Global Energy Leader." September. https://natural-resources.canada.ca/sites/www.nrcan.gc.ca/files/energy/files/pdf/EnergyFactBook2015-Eng_Web.pdf.

Office of Energy Efficiency & Renewable Energy. n.d. "Geothermal energy from oil and gas demonstrated engineering." Energy.gov. /www.energy.gov/eere/geothermal/geothermal-energy-oil-and-gas-demonstrated-engineering.

Trudeau, J. 2021. Minister of Environment and Climate Change Mandate Letter. Ottawa, ON; Office of the Prime Minister.

Trudeau, J. 2021. Minister of Foreign Affairs Mandate Letter. 2021. Ottawa, ON; Office of the Prime Minister.

"What is geothermal energy? What is Canada's potential?" GLJ. September 16. https://www.gljpc.com/blog/what-geothermal-energy-what-canada%E2%80%99s-potential.