



CANADA'S ACTIONS FOR RAPID DECARBONIZATION OF POWER SECTOR



BACKGROUND

A collaborative report from the Clean Energy Ministerial (CEM) on *Lessons Learned for Rapid Decarbonization of Power Sectors* was delivered to energy ministers and presented at the CEM13 in the United States in September 2022. In light of these lessons learned and discussed at CEM13, several jurisdictions signaled intent to develop Action Plans for power sector decarbonization. The first cohort of Action Plans was released at CEM14 in India in July 2023. The second cohort of action plans will be presented at CEM15 in Brazil.

The Action Plans, supported by the 21st Century Power Partnership, and other CEM workstreams via direct technical assistance and capacity building, are intended to focus on select implementation actions, given each country's existing power sector goals and activities, and are an opportunity for countries to display leadership in power sector decarbonization. The Action Plans are organized in a framework for Planning, Building and Operating, as well as Stakeholder Engagement where appropriate based on country priorities. They complement, but are differentiated from, other international power sector initiatives such as the Breakthrough Agenda (whose broad purpose is to raise collective ambition) and the Global Power System Transformation Consortium (whose goals are to convene power system operators to accelerate research innovations and foster peer learning).

These Action Plans are voluntary, developed by each country individually, not comprehensive of all activities within the jurisdiction, and are living documents that are subject to change



Canada

I. OPERATING

Actions for Rapid Decarbonization of Power Sector



JURISDICTIONAL BREAKDOWN

FEDERAL

- International engagement and negotiations
- Trade and investment
- Interprovincial and international energy (pipelines, power lines) regulation
- Nuclear energy regulation, waste, uranium
- Offshore, territories, and federal lands

SHARED

- Environmental regulation of new energy projects
- Scientific R&D
- Offshore petroleum in Atlantic Accord Areas
- Interprovincial energy (transmission)
- Infrastructure security and resiliency
- Energy efficiency

PROVINCIAL

- Electricity generation, transmission, and distribution including rates
- Regulation of natural resources development within the province
- Land use and project planning
- Royalty design and collection
- Intra-provincial energy resources infrastructure, distribution, and storage

INDIGENOUS

- Constitutionally protected rights on lands
- Role in energy project assessment/review, decision-making, monitoring and active participation in projects
- Ownership and management of energy systems



GENERATION MIX

- In 2022, non-emitting supply accounted for 82.5% of Canada's electricity generation largely due to hydroelectric generation (61.6%).
- In 2020, despite being the 39th largest country in terms of population, Canada was the 6th largest producer of electricity and the 2nd largest electricity exporter in the world.
- Electricity supply sources vary significantly across the country, as does the scale of decarbonization challenges.
 - Six provincial jurisdictions in Canada (QC, ON, MB, BC, NL, PE) have non-emitting supply shares of over 90%, with QC and MB boasting over 99%.
 - Other jurisdictions (AB, NB, NS, SK) are more reliant on fossil fuels. However, Alberta has the fastest growing share of renewable electricity generation, hosting over 90% of Canada's wind, solar, and energy storage additions in 2023.
- In 2022, Canada's electricity sector produced 639 terawatt-hours (TWh) of electricity per year, representing 20% of energy consumed annually in Canada[

Sources: Canada Energy Regulator, Pembina Institute (see Bibliography).



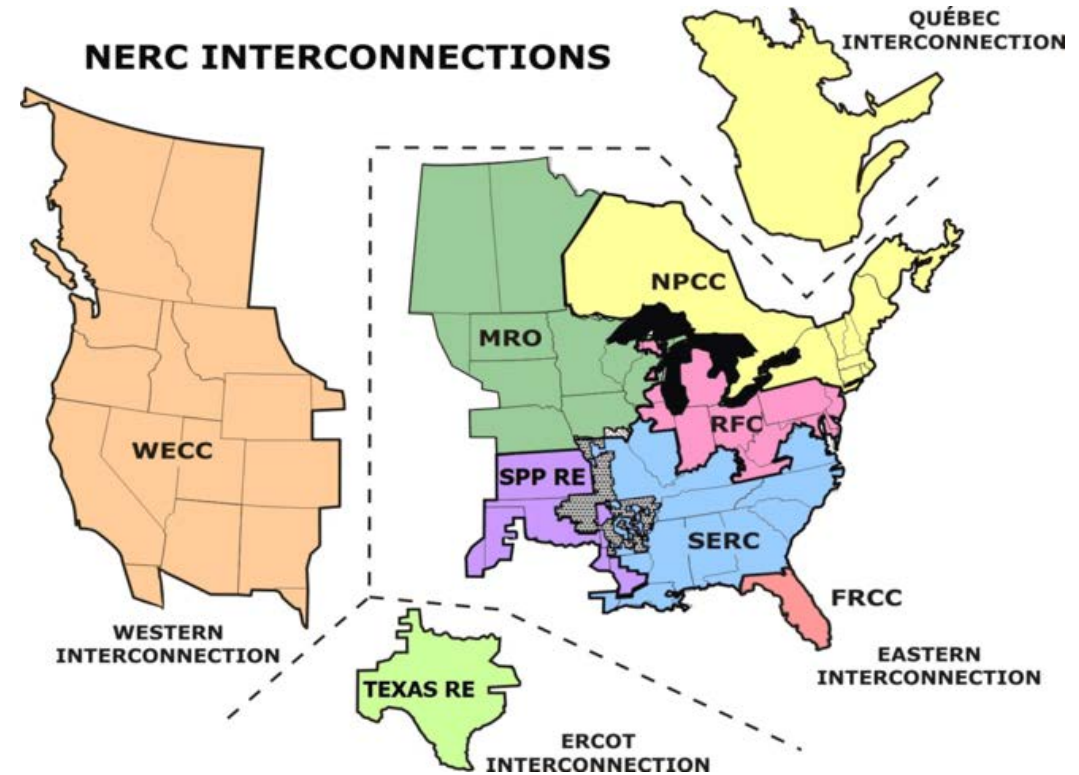
ELECTRICITY TRADE

- Canada's only international electricity trade partner is the United States. Provinces manage their own trade agreements with, as well as membership within, United States regional entities and system operators.
- There are currently 34 operating international power lines (IPLs) between Canada and the United States. Canada has just under 14,000 MW of transfer capacity with the United States. IPLs are regulated by the federal Canada Energy Regulator.
- In 2023, Canada had net electricity exports of 27.4TWh amounting to a net revenue of \$2.35 billion, down from 51.1TWh worth \$4.44 billion in 2022.
- Historically, provinces have prioritized international trade over interprovincial trade, causing provincial electricity grids to develop in a North-South orientation rather than East-West, and with greater international transfer capacity than interprovincial transfer capacity.

Source: Canada Energy Regulator (see Bibliography).

OPERATING SYSTEMS AND MARKET STRUCTURES

- In the North American Bulk-Power system, British Columbia and Alberta are connected to the Western Interconnection, while the rest of the provinces are connected to the Eastern Interconnection. Quebec is an exception, as it is served by its own independent interconnected system.
- Electricity regulation and market structures in Canada vary from a fully competitive electricity market in Alberta to a hybrid market in Ontario, to regulated and vertically integrated markets in all other provinces.
- Electricity prices in Canada are amongst the lowest in the world. However, prices vary by province with QC, MB, BC, and NL boasting the lowest prices due to their vast hydroelectric resources [Canada Energy Regulator].



Source: [NREL Operating Reserves and Variable Generation Report, 2011.](#)



Canada

II. PLANNING

Actions for Rapid Decarbonization of Power Sector



CANADA'S COMMITMENT TO NET-ZERO EMISSIONS

Timeline

- **2021:** Commitment to net-zero emissions economy by 2050
- **2024:** Clean Electricity Regulations
- **2050:** Economy-wide net-zero emissions

Key Legislation

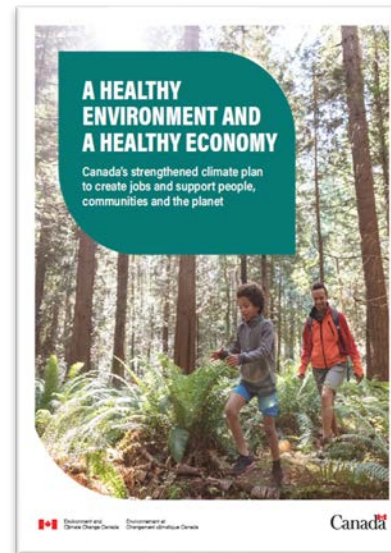
- Canadian Net-Zero Emissions Accountability Act (2021)
 - Enshrines in legislation Canada's commitment to achieve a net-zero emission economy by 2050; ensures transparency and accountability and requires public participation and independent advice to guide government efforts.

Groups Established

- Regional Energy and Resource Tables (2022)
- Net-Zero Advisory Body (2021)
- Canada Electricity Advisory Council (2023)

Canada's Climate and Power Plans

- Strengthened Climate Plan (2020)
- 2030 Emission Reductions Plan
- Powering Canada Forward (2023)



Source (from left to right): [Environment and Climate Change Canada \(2021\)](#); [Environment and Climate Change Canada \(2023\)](#); [Natural Resources Canada \(2023\)](#).



NET-ZERO STUDIES AND REPORTS

Canada's Net Zero Future: Finding Our Way in the Global Transition Study (2021)

Canadian Climate Institute

Achieving Net-Zero Pathways for Canada (2023)

Clean Prosperity Canada

Shifting Power: Zero-Emissions Electricity Across Canada by 2035 Study (2022)

David Suzuki Foundation

Canadian National Electrification Assessment Report (2021)

The Electric Power Research Institute

Canada's Energy Future 2023 Report

Canada Energy Regulator

Using Scenario Analysis to Assess Climate Transition Risk (2022)

Bank of Canada & Office of the Superintendent of Financial Institutions

Powering Canada: A Blueprint for Success (2024)

Canada Electricity Advisory Council

Ontario's Clean Energy Opportunity (2023)

Electrification and Energy Transition Panel



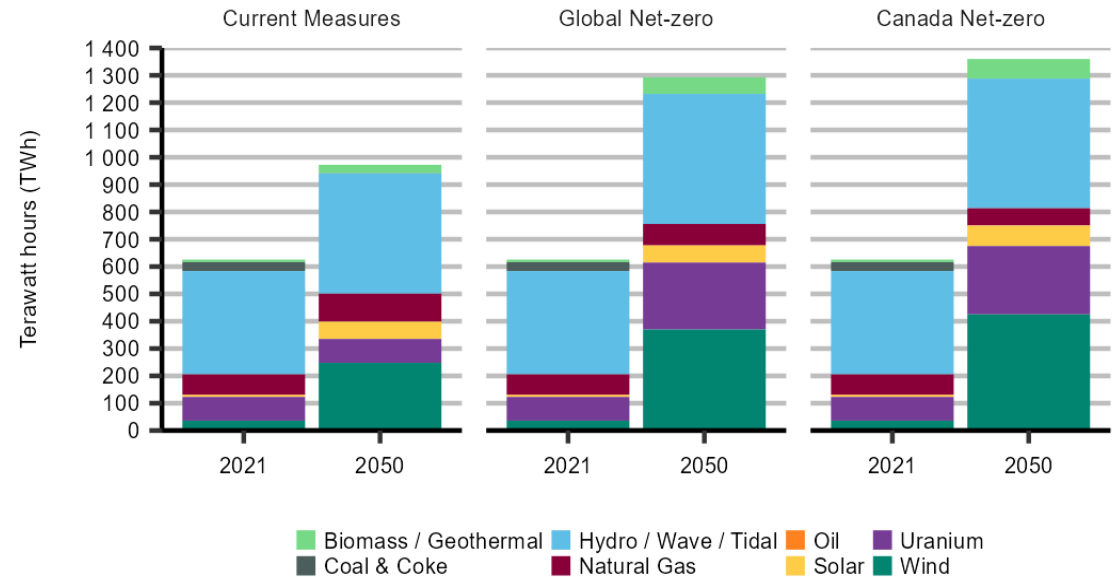
KEY TAKEAWAYS FROM NET-ZERO STUDIES AND REPORTS

Synthesis of Studies Results:

- Four key cornerstones for successful electricity transition identified: Speed, Affordability, Reliability, and Indigenous Participation.
- Electricity growth ranges from 1.5x – 2.1x.
- Variable renewable electricity sources will play a larger role, but scale varies.
- Hydroelectricity remains a valuable component of the Canadian grid, but importance is diminished.
- Nuclear could play an increased role, but type (conventional vs SMR) is not clear.
- Fossil fuel production will decrease, but capacity could be kept online.

Example of results: Canada Energy Regulator Energy Future 2023

Electricity Generation by fuel, all scenarios



Source: [Canada Energy Regulator \(2023\)](#).



Canada

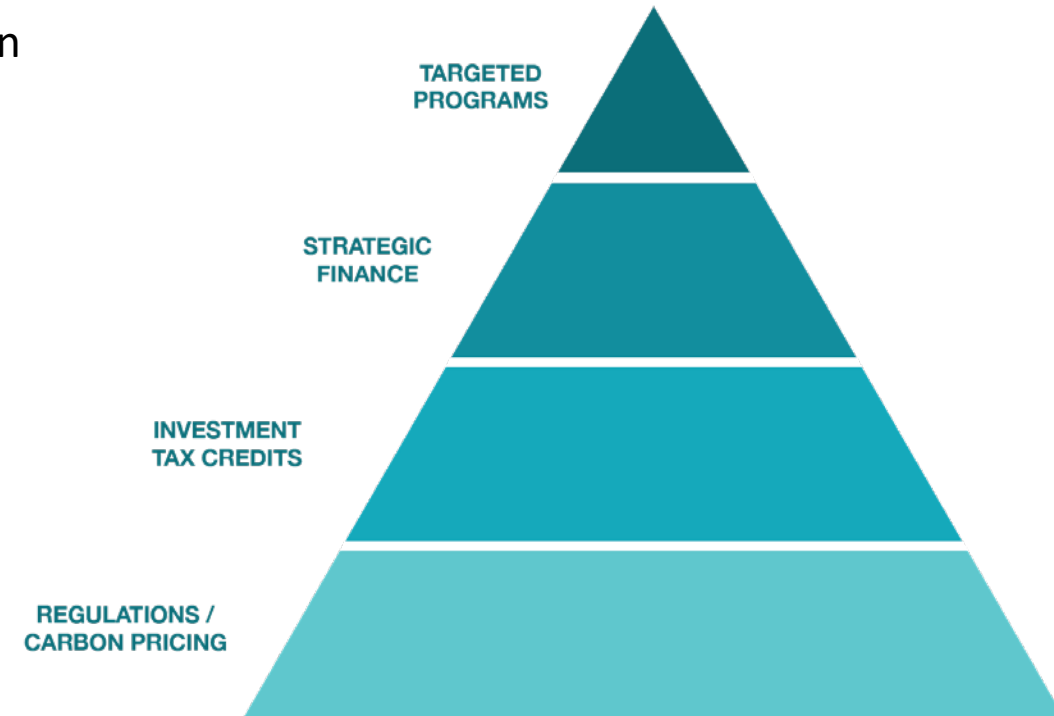
III. BUILDING

Actions for Rapid Decarbonization of Power Sector

INVESTING IN CLEAN ENERGY – FEDERAL FISCAL FRAMEWORK

Budget 2023 uses a tiered structure to approach building the Canadian Electricity Sector with 3 fiscal components:

- 1) Clear and predictable Investment Tax Credits (ITCs) as the anchor which offers foundational support for clean investments
- 2) Low-cost and abundant financing and targeted finance from the Canada Infrastructure bank and Canada Growth Fund
- 3) Targeted electricity programs where needed to ensure critical projects get built.



Source: Department of Finance (see Bibliography).



CLEAN ELECTRICITY REGULATIONS (CERs)

The CERs are part of measures from the Emissions Reduction Plan to help drive progress towards a net-zero emissions economy by 2050. Work on the CERs is ongoing, refined regulations are expected in 2024.

They are being developed around 3 core principles:

- 1) Maximize greenhouse gas reductions to significantly decarbonize the electricity grid.
- 2) Ensure grid reliability to support a strong economy and ensure Canadians are safe by having energy to support their cooling needs in the summer and warmth in the winter.
- 3) Maintain electricity affordability for homeowners and businesses.

Electrification and Energy Efficiency Overview

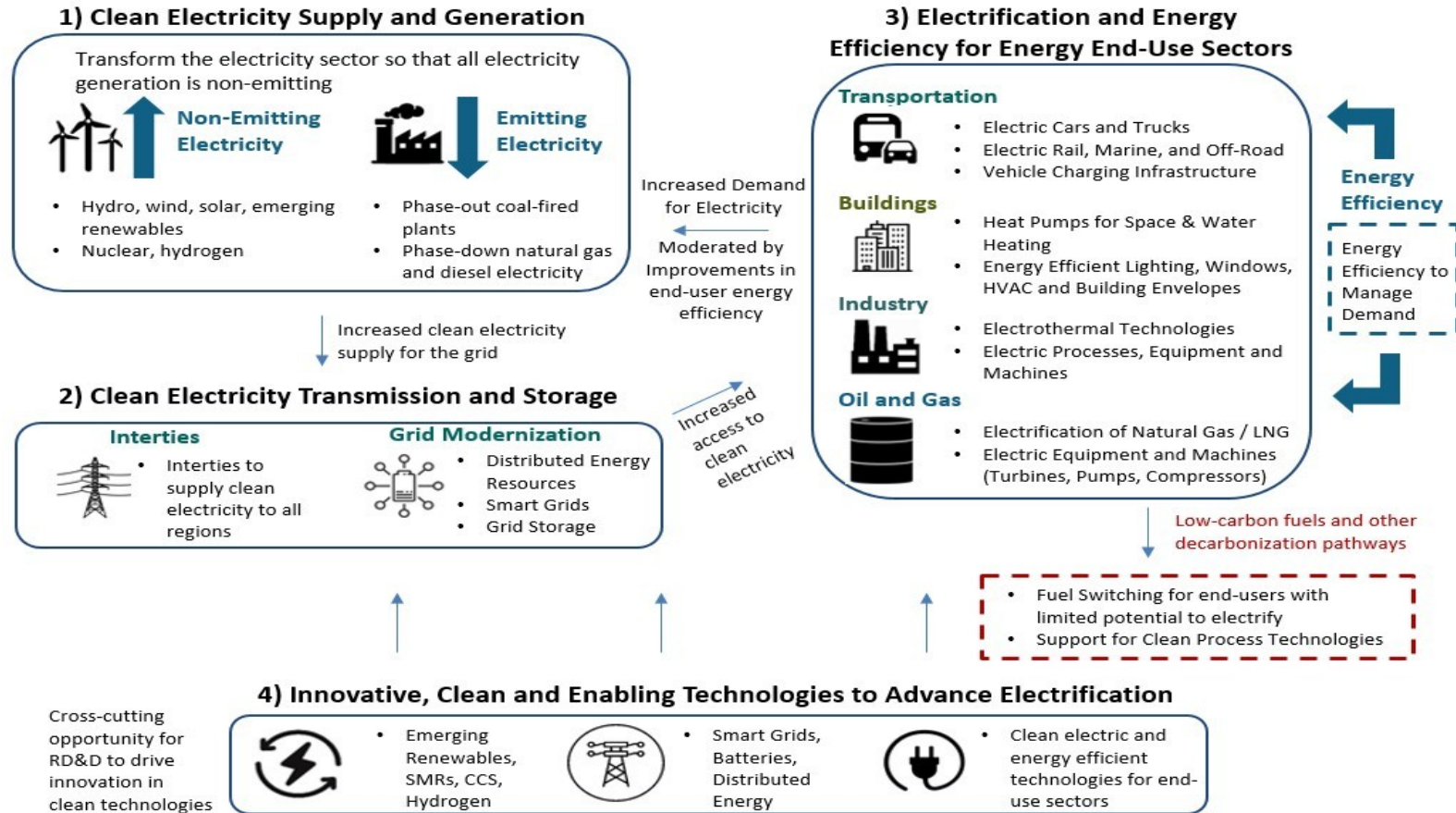


Image source: [Environment and Climate Change Canada \(2022\)](#).



INVESTMENT TAX CREDITS

Clean Electricity Investment Tax Credit

The ITC's design and implementation will be finalized in 2024.

15% refundable for eligible investments in:

- Non emitting electricity generation systems
- Abated natural gas generation
- Hydro and Nuclear refurbishments
- Stationary electricity storage systems that do not use fossil fuels
- Interprovincial electricity transmission equipment

Expected cost:

- \$7.2 billion 2024-25 to 2028-29

The Clean Tech investment Tax Credit announced in fall 2022, along with 4 other new ITCs announced between 2022 & 2024, will complement CE ITC by providing support to decarbonize industry.



STRATEGIC FINANCE

Canada Infrastructure Bank

- Budget 2022 announced a deepened role for the Canada Infrastructure Bank to invest in private sector-led infrastructure projects that accelerate Canada's efforts to reach net-zero.
- To date the CIB has investment commitments of **\$8.6** billion in 37 Projects

Budget 2023 announces at least:

- **\$10** billion through clean power priority area
- **\$10** billion Green Infrastructure priority area

Canada Growth Fund

- **\$15** billion arm's length public investment vehicle to attract private capital
- Use business instruments, such as contracts for difference, which absorb certain risks to encourage private investment in low carbon projects/technology/business/supply chains
- Fall Economic Statement 2023 announced that the Canada Growth Fund will be the priority federal entity to issue Carbon Contracts for Difference (CCFDs), including up to **\$7** billion in CCFDs and offtake agreements.



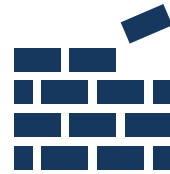
TARGETED PROGRAMS

- To **enable the building of electricity generation and delivery infrastructure** projects, the federal government funds the Smart Renewables and Electrification Pathways Program (SREPs) and the Smart Grid Program, among others, recently recapitalized with an additional \$3 billion.
- To **improve energy efficiency** across the economy, the federal government delivers programs such as Energy Efficient RD&D, and the Canada Greener Homes Initiative.
- To **support the electrification of transportation**, the federal government funds the Electric Vehicle Infrastructure Demonstration Program and the Zero Emission Vehicle Infrastructure Program.
- Other current federal efforts to contribute to the electrification of the economy include the Output-based Pricing System Proceeds Fund and the Decarbonisation Incentive Program.

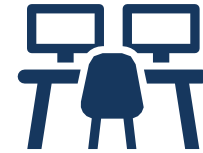
FUTURE ACTIONS FOR IMPLEMENTATION



Planning



Building



Operating

- Release of Clean Electricity Strategy in late 2024, with details on Canada Electricity Advisory Council advice
- Finalization and launch of Investment Tax Credits
- Finalization and enactment of the Clean Electricity Regulations
- Establishment of regulatory regime for Offshore Renewable Energy (Bill C-49)
- Advance collaboration with provinces and territories via Regional Tables (or alternative)
- Development and launch of Electric Vehicle Infrastructure Program



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