

The Transition
Accelerator



L'Accélérateur
de transition

Canada's Opportunity Playbook:
Pathways to Strategic Decarbonization

ENERGY CARRIERS

Electricity



7.1 ELECTRICITY

Function	Provides lighting, heating, cooling, and mobility, and powers motors, other machinery, and devices that underpin modern society; enables industrial processes.
GHG emissions	7.6% of national emissions in 2024, 49.6 Mt CO₂e.[61]*
Options for decarbonization	Decarbonization Pathways: Wind power, utility-scale solar PV, hydro (reservoir), nuclear (conventional reactors) Bridge Pathways: Gas with CCS Niche Pathways: Building-integrated solar PV, hydro (run-of-river), geothermal power, biomass combustion Enabling Pathways: Grid improvements, interprovincial and international interties, power storage, demand-side management, energy efficiency
Stage of transition	Emerging: Gas with CCS, geothermal power, small modular reactors Diffusion: Wind power, utility-scale solar PV, building-integrated solar PV, hydro (reservoir and run-of-river), nuclear (conventional reactors), biomass combustion, grid improvements, interprovincial and international interties, power storage, demand-side management, energy efficiency
Nature of the problem today	Some provinces remain heavily reliant on fossil energy due to ageing infrastructure, slow permitting processes, lack of carbon-neutral-optimized utility structures, slow uptake of technology, rising cost concerns, and a reluctance to engage fully with the energy transition
Other systemic issues	Energy reliability/security; electricity costs and efficiency losses; centralized versus distributed control
Opportunities and concerns	Reduction in air pollution; clean electricity exports; economic opportunities
Priorities for action	Phaseout of coal; interprovincial transmission ties between carbon-intensive and clean provincial grids; support for renewables deployment; buildout and modernization of grid infrastructure; measures to manage electricity demand
Longer-term issues	Increased electricity supply and storage capabilities to reliably electrify transportation, buildings, and industry; integrating a large proportion of intermittent/variable renewables (wind, solar) on electricity grids; accommodating more distributed generation where appropriate
Indicators of progress	Percentage of electricity demand supplied by non-emitting sources. Percentage of final energy demand supplied by electricity; approximately 18% (1,990 petajoules) of Canada's final energy end-use is currently provided by electricity.[81].

* All noted references can be found in the full Playbook document.

7.1.1 Current Status

The electricity system provides power for lighting, heating and cooling, mobility, and the operation of machinery and electronic devices. Its energy services are vital to the health and welfare of Canadians, as well as to economic productivity and growth. In 2024 Canada generated 625.2 terawatt-hours of electricity (about 2% of the world total) and the country was the seventh-largest global producer. In 2023 the sector employed over 110,000 people[82] and contributed \$51 billion to Canada's GDP.[80] Net electricity exports to the United States in 2024 were about 2.6% of Canadian production.[83]

Canada's electricity sector is currently among the cleanest in the world, with more than 83% of power coming from emission-free sources (60% hydro, 6% wind, 14% nuclear, and 3% from other renewables). Most of the remainder comes from coal (5%) and natural gas (12%) (Figure 7). The generation mix varies widely from province to province (see Figure 9).

Provinces can today be divided into three groups: hydro provinces with more than 90% of the generation from hydro (Quebec, 94%; Manitoba, 96%; Newfoundland, 97%; and British Columbia, 89%); fossil provinces where two-thirds or more of power is derived from fossil fuels (Alberta, 85%; Saskatchewan, 85%; and Nova Scotia, 73%); and mixed-supply provinces (Ontario with 55% nuclear, 24% hydro, and 13% wind/solar; and New Brunswick with 40% nuclear, 23% hydro and 11% wind/other renewables). The remaining jurisdictions of Prince Edward Island (PEI), the Yukon and Northwest Territories, and Nunavut together account for less than 0.5% of Canadian production.

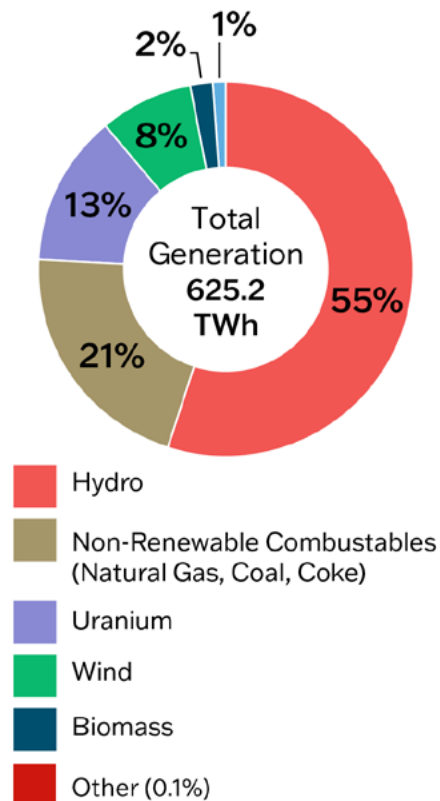


Figure 7. Canada, electricity generation by fuel type (2025)

Source: Statistics Canada Table: 25-10-0015-01, 2025

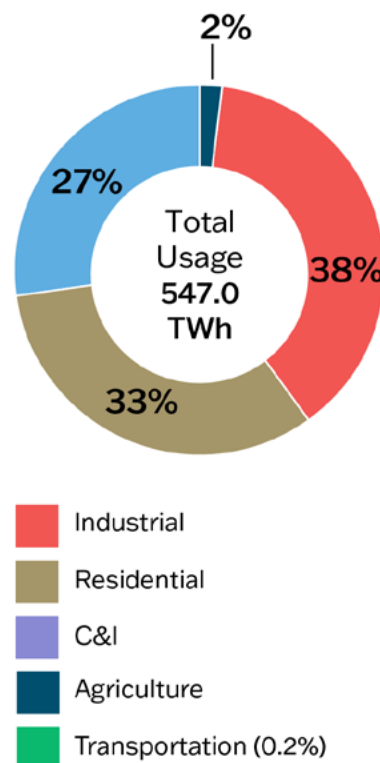


Figure 8. Canada, electricity usage by major sector (2023)

Source: NRCAN, 2023 Comprehensive Energy Use Database.

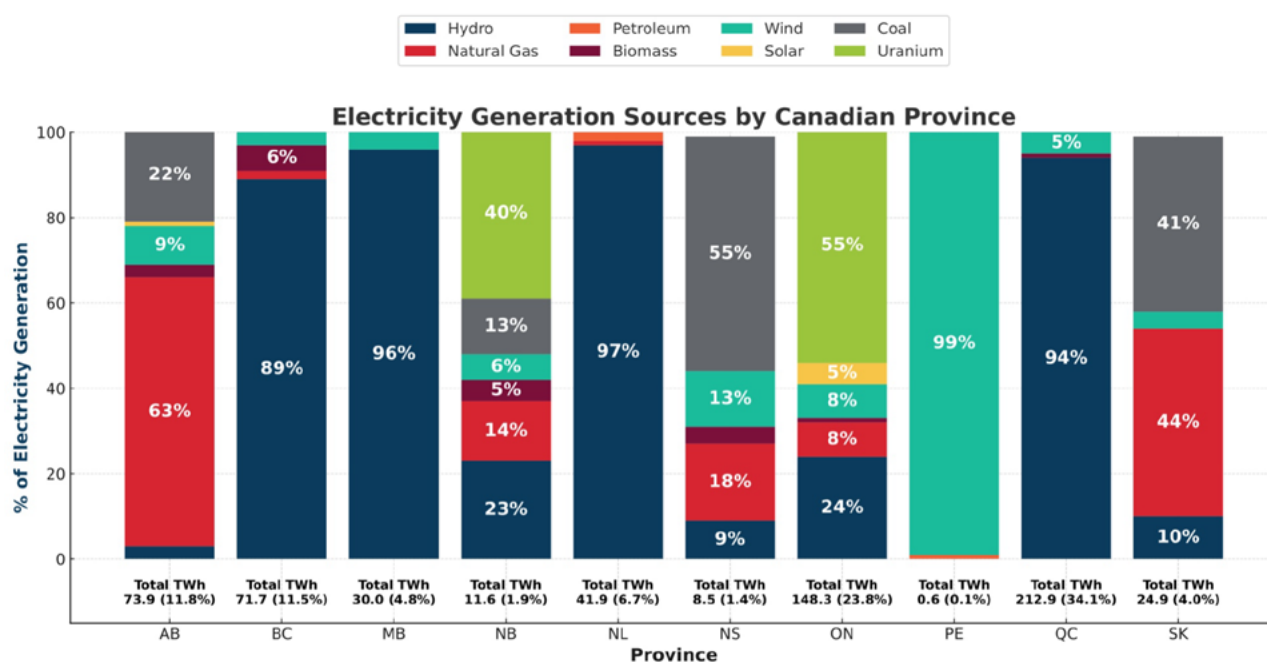


Figure 9. Electricity generation sources by Canadian province, 2021*

Source: Canadian Energy Regulator (CER), 2022

*The sum of individual percentages may not equal exactly 100% due to rounding by the CER.

The division of powers under Canada's constitution means that electricity systems are essentially under provincial control. However, the federal government retains regulatory oversight in several areas, including the nuclear industry, electricity exports, national and international environmental pollutants, inter-provincial transmission, and electricity metering, as explicitly provided for by the *Electricity and Gas Inspection Act*.^[84] Provinces have always viewed electricity policy as a critical lever for economic development, and jealously guard control over generation and transmission. North-south grid interties with U.S. markets are more developed than east-west interprovincial grid connections.^[55] The eight mainland Canadian provinces are integrated into the grid balancing areas of the North American Electric Reliability Corporation (NERC).

In most provinces, electrical utilities are vertically integrated Crown corporations. Deregulated wholesale electricity markets exist in Alberta and to some extent in Ontario. Industry accounts for the largest share of domestic consumption (39%), followed by residential buildings (32%), the commercial and institutional sectors (27%), agriculture (2%), and transport (0.2%), with variation across provinces (Figure 8).

Canadian electricity prices are among the lowest in the OECD but differ from province to province. There are arguments over how best to compare rates (at what level of monthly consumption, before or after taxes, and so on) but the basic pattern of variation is captured in Figure 10. Industrial bulk users receive significant discounts, and hydro provinces typically have the cheapest rates.^[85]

Average Large Industrial and Residential Electricity Prices* (as of April 2023) in cents/kWh

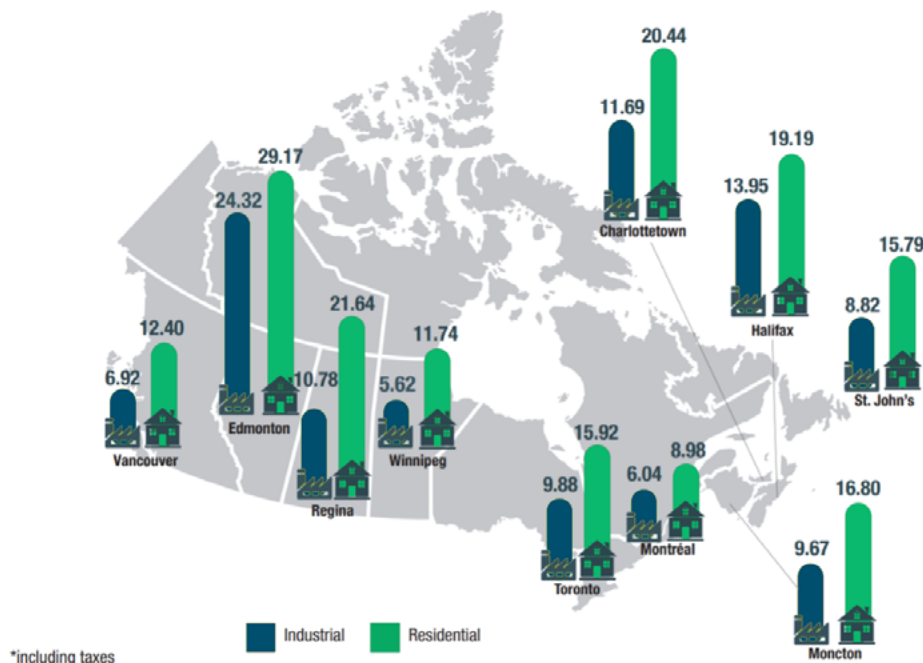


Figure 10. Average large industrial and residential electricity prices, April 2023

Source: NRCAN, 2023. Electricity Facts.

Climate change–related drought conditions in recent years have measurably strained Canada’s hydroelectric generation capacity. Hydropower typically provides around 60% of the nation’s electricity, so prolonged low precipitation and high temperatures can significantly constrain overall supply.[86] In 2021, Manitoba Hydro incurred an estimated \$248 million¹ revenue loss due to drought-driven hydropower shortfalls.[87] After a brief recovery in 2022, widespread drought returned by 2023, driving an 8.4% year-over-year drop in hydroelectric and pushing total generation to its lowest level since at least 2016.[86] This hydro shortfall has persisted into 2024, with national hydropower production remaining about 3.5% below the recent five-year average as drought conditions continued in parts of central and eastern Canada.[88]

These climate-driven deficits have also disrupted electricity trade and grid operations. With reduced water inflows, Canada’s exports

of electricity to the United States fell by roughly one-quarter in 2023—the lowest export volume in years—as utilities dialed back cross-border sales to preserve reservoir levels.[80] To maintain reliability, other sources were leveraged: domestic thermal generation was ramped up, and electricity imports from the U.S. surged by over 50% year-on-year.[89] Such drought-related stresses on the grid are expected to recur; federal climate assessments project that summer droughts will become more frequent and intense in key hydropower regions of southern Canada under warming scenarios.[90]

The recent hydroelectric shortfalls and trade imbalances of 2020–2024 are therefore seen as a preview of the challenges climate change poses to Canada’s electricity system, underscoring the need for adaptive measures to safeguard grid resilience.

¹ In 2021 Canadian dollars

Canada's Electricity Trade with the U.S.*

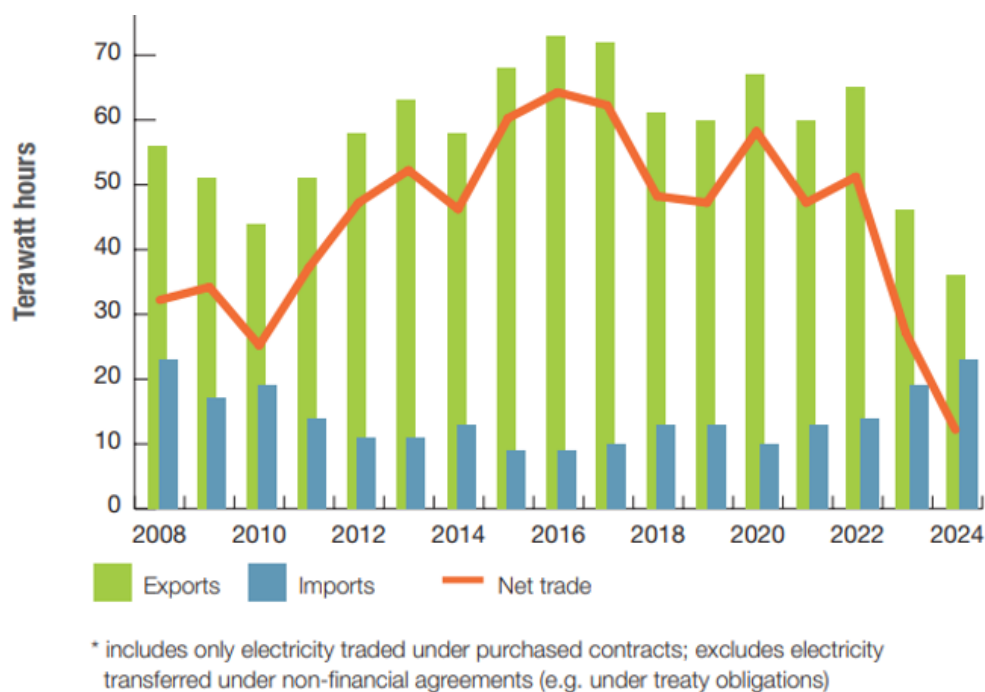


Figure 11. Canada's electricity trade with the United States, 2008-2024

Source: Natural Resources Canada, 2026. *Energy Fact Book 2025-2026*[91]

7.1.2 Nature of the Problem

Electricity systems have a pivotal role to play in decarbonization, as power can displace fossil fuel end-uses in transport, buildings and industry. At a global scale, the shift to low carbon electricity is well underway, with dramatic falls in the price of wind and solar generation encouraging ever wider deployment (see Figure 12).[92]

In this context, Canada enjoys three distinct advantages. First, our electricity supply is already substantially decarbonized.[93] Second, we have generous renewable

resource endowments (including wind and solar, but also tidal and geothermal), often located in areas where fossil energy dependence is highest today. Third, our abundant legacy hydro (the third largest installed capacity in the world[80]) can provide an energy storage solution to help balance grids and facilitate the large-scale integration of intermittent renewables.[94] Canada's ready access to low-carbon energy and potential to rapidly complete the decarbonization of electric supply is a competitive advantage to attract businesses seeking cheap net-zero emission power (for battery or EV manufacture, minerals processing, etc.).

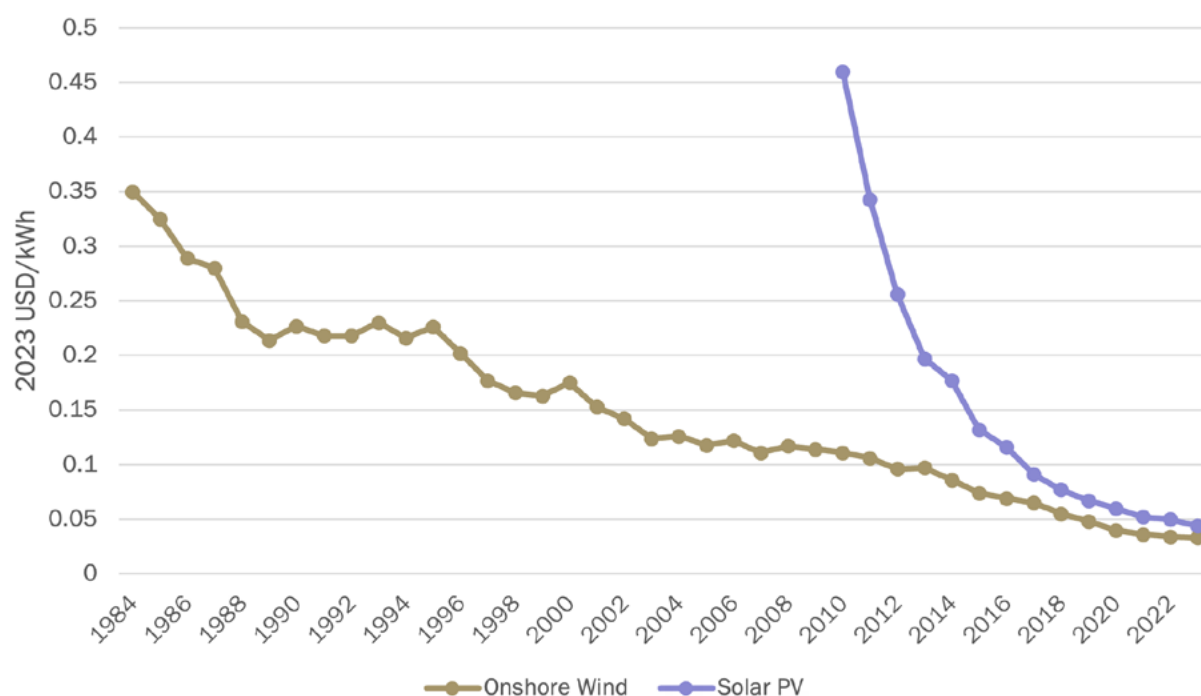


Figure 12. Global weighted average of levelized cost for onshore wind and solar PV, 1984-2023

Source: IRENA, 2023[95]

Nevertheless, the current split between low- and high-carbon provincial electricity systems poses challenges. The financial and political effort required to transform the fossil-dependent systems will be significant, requiring the construction of new generating capacity, retirement of fossil assets before their anticipated lifetime, and movement away from coal or gas produced within the province.

Most models suggest the cost of fully decarbonizing Canadian electricity systems could be lowered by closer inter-provincial coordination. While this flows against the tradition of provincial independence,[55,96] the federal government appears interested in encouraging such linkages.[97–99] More recently, eight provinces and territories signed a memorandum of understanding to build better-connected country-wide electrical transmission infrastructure.[100] In 2023, the federal government introduced Clean Electricity Regulations (CER) to establish a national framework for achieving a

net-zero electricity grid by 2035, signaling a stronger federal role in shaping long-term power system planning and emissions performance across provinces.

Other current challenges relate to public sensitivity over rising electricity costs, aging electricity infrastructure, electricity rate structures not aligned with the shift to net zero, and potential opposition to large scale energy projects (generating facilities, transmission lines). Over the past decade, average electricity costs in Canada have increased more rapidly than inflation.[101] The largest increase has been in Ontario, where prices rose by two thirds between 2007 and 2016. Although household energy spending averages only 2.6% of domestic budgets, increases hit lower-income families particularly hard. And electricity price increases are always politically salient. Drivers of this rise in Ontario included the costs of moving off coal, refurbishment of aging nuclear plants, grid modernization, and

decades of artificially suppressed prices and lack of investment. Although price rises in Alberta have been modest (because of exceptionally low natural gas prices), managing cost pressures will be an important consideration in advancing electricity decarbonization. Much of Canada's electricity infrastructure dates from the post-war period, requiring projected investments of nearly \$1.7 trillion² by 2050, to meet clean electricity demands.[102] Public opposition to large energy infrastructure projects is not confined to pipelines, and resistance to the construction of generation assets (power plants, wind or solar developments) and transmission could raise costs, introduce delays or forestall potential projects.

7.1.3 Net-Zero Pathways

Moving Canada's electricity systems towards net zero involves two interrelated tasks: decarbonizing the existing electricity supply and expanding electricity systems so they can power sectors currently dependent on end-use fossil fuels. Both involve (a) building net-zero electricity generation; (b) adjusting electricity grids to make them more flexible, smart, and resilient; and (c) managing demand and encouraging energy efficiency to limit the need for additional generation. This will require a combination of centralized and decentralized energy solutions. Ultimately a net-zero electricity system may be integrated more closely with other parts of the energy system: for example, with hydrogen produced through electrolysis (or from fossil resources with CCS), which can serve as an electricity storage medium and meet demand in other sectors.

The first challenge—decarbonizing existing electricity supply—is most acute in fossil dominated provinces (Alberta, Saskatchewan,

Nova Scotia), but there is work to be done in New Brunswick and Ontario. The second challenge—expanding capacity to meet increased demand—is often assumed to be gradual, yet industrial demand can spike abruptly, particularly from sectors such as data centres, which require substantial capacity additions within short time frames. This rapid growth places pressure on electricity systems even in provinces like Alberta, Quebec, and Newfoundland, which currently have power surpluses.

Modelling suggests that electricity demand might double or more by mid-century in a decarbonized economy.[78,79] However, this estimate does not fully account for the recent emergence of AI data centres, whose significant electricity consumption could further accelerate the need for grid expansion. Increasing power production and distribution on this scale over coming decades represents an enormous task—especially in a context where energy projects today can stir substantial public opposition.

There are many ways to make relatively inexpensive net-zero emission electricity, but each approach has costs as well as benefits.[94] Hydro forms the backbone of most Canadian electricity systems, providing cheap and reliable legacy power. But sites close to demand centres have already been exploited, environmental impacts are substantial, capital costs and cost overruns (such as those at Muskrat Falls in Labrador and the Site C dam in British Columbia) are a significant concern, and there has been opposition from Indigenous communities. It is generally assumed that while new hydro generation will continue, most future capacity additions will come from other generation sources. Tremendous wind resources and falling prices mean that wind often represents the cheapest incremental addition to grids.

² In 2011 Canadian dollars

Wind is intermittent in the short term, and its energy output varies by season, so a backup and/or storage is required when it does not blow. In the near to medium term, some jurisdictions may continue to rely on limited amounts of dispatchable thermal capacity (primarily natural gas-fired plants) to manage this intermittency. In these contexts, natural gas generation functions primarily as a system reliability and affordability backstop rather than a growth pathway for electricity supply, with utilization expected to decline with the expansion of wind energy storage, interties, and demand-side flexibility.

In some Canadian jurisdictions there is public opposition to further wind development. Offshore wind is attracting significant global investment and holds considerable promise for Canada's coastal provinces, including Ontario on the Great Lakes, as well as Nova Scotia, which is actively exploring major offshore wind projects. The costs of solar photovoltaic continue to fall.[103] Canada has substantial solar potential, but daily and seasonal variability pose significant challenges. Specifically, the mismatch between peak energy demand—driven primarily by electric heating and heat pumps during cold winter nights—and the lowest

availability periods for wind and solar generation highlights a critical obstacle. Addressing this seasonal imbalance will be central to integrating renewable energy successfully into Canada's electricity grid.

Other renewables (tidal, wave, geothermal) have promise but remain further from market and are limited geographically. Nuclear provides reliable, GHG-emission-free baseload power in Ontario and New Brunswick. Disadvantages include high capital costs, inflexibility (plants cannot be ramped up or down to follow intermittent renewables), security, waste disposal, and substantial public opposition to new build.[104] Small modular reactors (SMRs) are a possibility for the future, with Canada's first project underway in Ontario and expected to be operational by around 2030. However, the technology remains to be proven, and widespread deployment may be several decades away.[105] Fossil combustion with CCS (with removals to handle residual emissions) is possible. But coal with CCS appears expensive compared to renewables and emits many hazardous pollutants.[106,107] Gas with CCS could serve to back up variable renewables.



For now, wind presents the cost point for other technologies to beat, but solar continues to decline rapidly. Least-cost models of decarbonization in Canada currently suggest massive wind power additions even in hydro provinces.[96] Energy storage is an important consideration in building low-carbon generation capacity. Batteries continue to decline in price, and electricity/hydrogen linkages (where hydrogen serves as storage and a complementary energy carrier) could increase the overall flexibility of the energy system.

But it is not possible today to anticipate exactly how the low-carbon supply will develop. Choices in each province will be influenced by specific system attributes (sunk investments), capacities and decisions of neighboring jurisdictions, the evolution of technologies and comparative costs, public attitudes, market design, and political calculus.

Reliable and flexible grids will be essential to deliver decarbonized supply and expanded end-use electrification. Grids will accommodate variable and more widely distributed generation (e.g. wind and solar), support larger power flows (delivering more energy to end users), connect over longer distances (to balance loads), service more diverse end uses (electric vehicle charging) and allow more sophisticated demand management (to reduce peak usage). Investment in interprovincial and/or international interties, storage (battery, pumped hydro, compressed air, hydrogen, etc.), enhanced communications, and control systems (smart grids) will be important. So too will be adjustments to market design and regulatory mandates to accelerate needed investment.[79,108–111]

Energy efficiency and demand management can reduce the generation and transmission capacity required to deliver expanded energy services. Efficiencies can be sought on the supply side to enhance generator

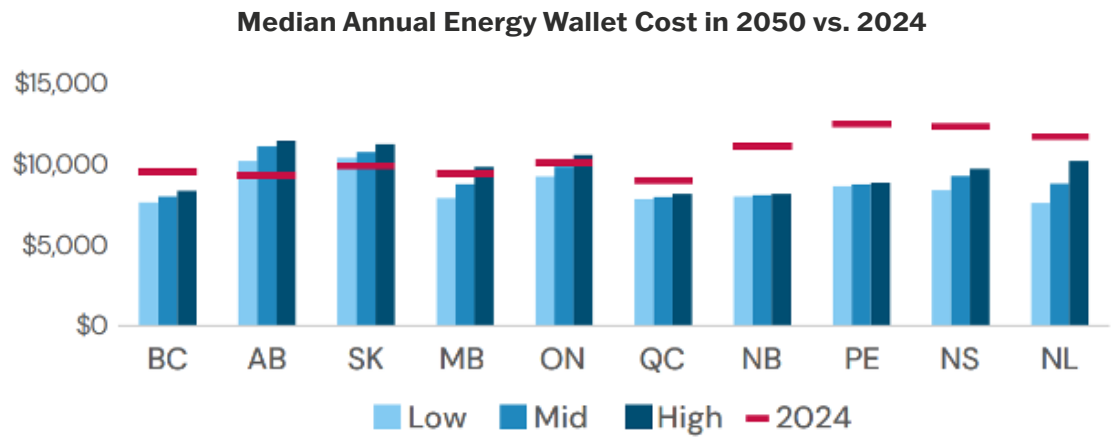
performance and reduce transmission and distribution losses, but more significantly on the demand side through improvements in technologies providing energy services (for example, space conditioning for buildings). Demand management programs that displace use over time (to off-peak hours) or allow customer loads to be curtailed during extreme weather events or other crises can reduce the need for peaking plants and transmission upgrades and contain costs.[112] These programs can involve new technologies, program designs, and institutions (energy efficiency utilities, “behind the meter” energy management companies). While efficiency gains and demand reduction strategies can contribute to managing electricity needs, investment in new generation and transmission capacity should be prioritized. The risks associated with inadequate electricity supply are substantial, whereas the downside of slightly overbuilding capacity is negligible. Moreover, prioritizing efficiency before expansion may hinder progress and limit the availability of essential new energy sources required to support growing industries and economic development.

An important but open question for long-term decarbonization is the extent to which the supply and management of power is centralized with the electrical utilities or decentralized to the customer level. Very different visions of net-zero energy systems co-exist today. On the one hand, there are highly centralized designs where power is produced in areas with maximal renewable resources and then moved across continents to load centres.[113] While existing long-distance transfers predominantly run north-south, emerging renewable energy emphasizes east-west transfers to align with solar availability across time zones. And on the other, highly decentralized models where electricity is produced and consumed locally (perhaps involving microgrids, or tens of millions of “prosumers” producing and

consuming their own power), with traditional grids serving backup and balancing functions.[114] Choices that would generate one or another alternative are political as well as being related to economics, technologies and resource availability. Yet there are many reasons for believing that real-world systems will involve a complex and nuanced mix of centralized and decentralized elements. There are advantages to local power production at the building or community level, such as reducing the need for large-scale projects, avoiding transmission losses and grid congestion, and promoting increased local control and resilience. And yet economies of scale and linkages between regions with different resources and load profiles are also attractive. So it makes sense to take a

pragmatic approach that combines centralized and decentralized elements to optimize overall benefits as net-zero-emission power systems are built out.

The two interrelated tasks of decarbonizing electricity supply and expanding systems must be done with affordability in mind. If done well, they will leave most Canadian households better off. In nearly every province, median energy wallet costs in 2050—defined as the total direct expenditure a household spends on energy—are expected to remain stable or fall compared to today, even under ambitious transition scenarios[115]. Clean electricity paired with smart grid investments and better efficiency isn't just good to reduce emissions; it's a cost-saving strategy for households across the country.



Note: All monetary values are expressed in 2024 Canadian dollars (CAD).

Figure 13. Median Annual Energy Wallet Cost between 2024 and 2050, according to three growth rates for electricity grids (low, mid, high).
Source: The Transition Accelerator, Household Energy Affordability in a Net-Zero Future, 2024

7.1.4 Provincial Initiatives

Critical decisions about the future of Canadian electricity systems will be made at the provincial level.

In making choices, the provinces face distinct geographic circumstances and resource endowments, legacy generation and transmission infrastructure, regulatory structures, and political economic realities.

Ontario

Ontario has a hybrid market design with substantial public ownership, complex lines of authority, and 60 local distribution companies. On May 1st, 2025, the province launched a major update to its electricity market to modernize the system and improve the way the market is scheduled and priced.[116] Electricity policy is highly politicized, with recent arguments about the roll out of renewables and the rise in energy prices. After the coal phase-out, Ontario has had a comparatively clean grid, dominated by nuclear power. But as nuclear units are taken out of service for refurbishment over the coming decade, increased emissions from natural gas plants are likely. To bolster supply and address these pressures, the province is undertaking major procurements of new electricity generation[117] and has completed its largest battery storage procurement to add grid flexibility.[118]

At present the province is firmly committed to a reinvestment in nuclear power. The stakes for the province and Canada's nuclear industry are high. Ontario's first Integrated Resource Plan (IRP) includes major nuclear investments in refurbishments and expansions including both conventional reactors and SMRs. Whether or not longer-term plans for nuclear expansion survive cost overruns and project delays which have often plagued earlier investment rounds, the province will eventually require additional wind and solar

capacity. Enhanced transmission interties with Quebec and aggressive energy efficiency programs could keep costs down and slow the speed at which new generation capacity must be built out.[119]

Alberta

Alberta completed its coal phase-out in 2024, marking a major milestone for decarbonizing its grid. Nevertheless, the province faces major challenges balancing continued decarbonization with affordability and reliability. Its deregulated electricity market remains heavily reliant on natural gas, raising concerns about locking in emissions-intensive infrastructure.

Wind and solar have grown quickly since 2019 but new policy restrictions on siting and reclamation have created regulatory uncertainty.[120] Still, given their cost advantages, renewables remain central to Alberta's energy future. Opportunities to expand grid interties with British Columbia and to develop geothermal and hydrogen offer further pathways to diversify supply.

A key uncertainty is the potential electrification of oil sands operations, which could drive major new electricity demand. Managing this shift while maintaining grid stability will require integrated long-term planning and coordination with federal infrastructure efforts.

Saskatchewan

Saskatchewan's electricity system is vertically integrated and primarily operated by a single public utility, SaskPower, with the exception of Saskatoon, which has an independent distribution utility. The system remains heavily reliant on coal and natural gas generation. Unlike provinces with large hydroelectric or nuclear fleets, the province has minimal non-emitting baseload capacity, giving it one of the longest decarbonization pathways in Canada. The province still

operates multiple coal-fired power units, including one with CCS (Boundary Dam 3), as well as gas-fired plants. The dependence on fossil fuels means that the province requires major new investments in generation and transmission infrastructure to transition to a low-carbon supply.

In 2023, the province signaled plans to extend the life of its coal-fired plants (which run on locally mined coal) even as current federal regulations mandate phasing out unabated coal by 2030. Saskatchewan has set a goal of net zero by 2050 and has asserted provincial jurisdiction over power generation.[121–123] In the meantime, SaskPower is pursuing a diversified transition strategy by expanding renewables, with plans to add up to 3,000 MW of wind and solar capacity by 2035, maximizing imports of hydroelectric power from Manitoba, and exploring nuclear energy.[121]

Manitoba

In Manitoba, hydroelectric dams produce most the province's power, and this hydro dominance keeps Manitoba's grid emissions among the lowest in Canada—though drought years can pose challenges.

The province's surplus of hydroelectricity is sold via interconnections, with export sales contributing to over one-fifth of Manitoba's electricity revenue. However, politically, the province has begun prioritizing domestic use of its hydro resources. In 2025, it declined the renewal of 500 MW of U.S. export contracts to reserve more power for regional economic development.[124] A major initiative in this regard is the proposed Kivalliq Hydro-Fibre Link, which is a combined transmission and broadband corridor that will send Manitoba's surplus power to Nunavut's Kivalliq region to displace diesel.[125]

Nova Scotia

Nova Scotia has long depended on coal-fired power, with coal generating over half of the province's electricity in 2021. In recent years, however, provincial law has mandated phasing out coal and reaching 80% renewable electricity by 2030.[126]

In 2024, the province enacted major reforms to modernize electricity regulation and drive its clean energy transition. The *Energy Reform Act* created a new Nova Scotia Energy Board and established an independent system operator to take over grid operations and planning from Nova Scotia Power to ensure more transparent, climate-aligned decision-making.[127] Nova Scotia also intends to add roughly 1,500 MW of onshore wind capacity by 2030[128] (including Indigenous-led projects like the 94 MW Mi'kmaq-owned Weavers Mountain wind farm[129]) and increasing imports of hydroelectricity via the Maritime Link from Labrador. As of 2025, the province has brought renewables to 43% while cutting coal's share down to 36%.[128]

New Brunswick

New Brunswick's generation is a mix of major hydroelectric facilities and the Point Lepreau nuclear station, which together provide almost two-thirds of the province's electricity.[130] The remaining third is sourced from emitting sources, such as coal, oil, and gas.[131] The province is now positioning its grid for decarbonization in line with current federal CER target of net zero by 2035. The province has committed to phase out coal by 2030 and is planning major clean energy investments. This includes a nearly fivefold expansion of wind power by 2035 (adding 1,400 MW of new wind power) and solar power (adding 200 MW)[130]. NB Power is also planning to build SMRs at Point Lepreau by 2035 (adding 600 MW), with a 100 MW unit scheduled for 2029.[130]

In 2024 the federal and provincial governments reached an understanding to allow flexibility under the new clean electricity rules, recognizing New Brunswick's need to balance decarbonization with affordability and reliability. Recent developments have focused on NB Power's financial health. The utility has faced rising rates (20% in two years) and \$5 billion³ in debt.[132]

British Columbia

A vertically integrated Crown corporation (BC Hydro) serves more than 90% of customers in B.C. Electricity demand is forecast to grow strongly over the coming decades. Further hydro development is politically contentious, as is the development of wind and run-of-the-river projects by independent power producers (under contract to BC Hydro). The completed Site C project on the Peace River attracted significant opposition from Indigenous communities and environmental groups. But the province has enormous wind potential. BC Hydro is beginning to harness this through regular calls for power: the utility launched its first competitive power procurement in 15 years in 2024 and is set to add about 5,000 GWh per year of new wind-based generation from that call.[133] Going forward, BC Hydro plans to hold such calls bi-annually to continuously bring new renewable energy online, primarily tapping the province's abundant wind resources.

Key areas of focus in the future include efficiency and demand management, continuing modernization and upgrades of transmission and existing hydro facilities, and incremental addition of renewables, especially wind. BC Hydro's expanded demand management programs emphasize energy efficiency and peak shaving, even piloting "virtual power plants" that aggregate distributed energy resources. For example, in 2025 the utility debuted a Peak Saver pilot project, installing 200 coordinated residential

batteries in two communities to improve grid resilience.[134] They are also investing in grid infrastructure by working to expand the transmission system in the northwestern part of the province to support electrification and economic development in that region.[135] British Columbia's ambition to become a major LNG exporter remains a critical issue, as does a commitment to electrify future liquefaction and associated upstream natural gas production infrastructure (compressors, pumps, etc.), with clean electricity, with obvious implications for electricity supply.[136]

Quebec

Quebec's electricity system is dominated by Hydro-Quebec, a publicly owned, vertically integrated utility known for its vast hydroelectric resources. This network ensures that Quebec has amongst the lowest grid emissions in North America, with over 99% of electricity generated from renewable sources. Nevertheless, anticipated growth in domestic electricity demand due to electrification goals, including transportation and industrial expansion, has prompted significant new infrastructure and generation investment. In 2024, Hydro-Quebec launched its 2035 Action Plan, aiming to meet rising demand through significant grid modernization and diversification of generation sources, notably investments in new wind generation capacity of over 10,000 MW.[137] In early 2024, the utility accepted eight bids from five developers to build 1,550 MW of new onshore wind under a call for tenders launched in 2023.[138]

The province is also ramping up solar generation by setting a target of 3,000 MW by 2035.[139] This marks a major shift for a province almost exclusively reliant on hydro power. Further, there has been a renegotiation of the utility's longstanding power agreement with Newfoundland and Labrador over Churchill Falls. Following a

3 In 2025 Canadian dollars

change of government in Newfoundland and Labrador, the 2024 agreement-in-principle was replaced by an enhanced agreement signed in August 2026 that guarantees supply from Churchill Falls until 2077. It also gives Hydro-Québec access to a total potential of more than 10,000 MW from Labrador, of which 6,915 MW is firm and 3,850 MW is tied to potential future projects, such as a Labrador wind farm and an additional hydroelectric facility at Churchill Falls.[140-142]

In all cases, provincial politics plays a significant role in the structure and design of electricity markets. If Canada is to meet long term decarbonization goals in a cost-effective manner there will need to be a concerted effort to break through parochial electricity market rules that prevent access and flexibility, and to enhance the potential for inter-jurisdictional coordination.

Competitiveness Implications

Canada's hydro provinces can make an offer most jurisdictions cannot: legacy reservoirs provide dispatchable clean electricity and the grid flexibility to integrate large volumes of wind without the dedicated storage costs that raise system prices elsewhere. The real competitive asset is hydro-wind complementarity, not clean generation on its own, and it functions as an industrial siting advantage at a moment when data centres, battery plants, and minerals processors are competing globally for firm, affordable, low-carbon power. Manitoba's 2025 decision to redirect 500 MW of export capacity toward domestic economic development suggests provinces are beginning to treat clean electricity as an economic development tool rather than an exportable surplus. But the window narrows as other jurisdictions build out their own clean supply. Whether Canada captures that investment depends less on generation endowment than on how fast provinces can connect strategic industrial loads to firm clean power.

7.1.5 Priorities for Action

Priorities for action differ by province. For the fossil-dependent jurisdictions, increasing energy efficiency, investing in renewable generation, building interties with neighboring hydro provinces, and phasing out coal are the most urgent tasks. Current federal regulations set 2030 as the deadline to end unmitigated coal generation, but decommissioning plants earlier will lower carbon intensity and secure immediate air quality gains. Simply replacing coal plants with new gas plants should be avoided. With the continuing fall in wind and solar costs, it makes more sense to build renewable resources steadily, particularly

since the fossil-based systems are well buffered with gas. As it is quite possible that emission abatement targets will be further tightened over coming decades, even "CCS ready" plants will pose a risk, so a straight switch to renewables is more prudent to prevent the further stranding of fossil assets.

For the hydro-rich provinces, incremental buildout of wind or solar can be timed to provide additional supply as needed. Large hydro facilities provide opportunities for storage to meet peak demand and balance intermittent resources. Active exploration of interties with neighboring provinces offers the possibility of more flexible and resilient

grids, and additional revenues or reduced power costs, through power transactions. At some point all jurisdictions should:

- Put greater effort into long-term power system planning by starting from the target of meeting anticipated needs while achieving net-zero GHG emissions by mid-century and modelling backwards. This involves first estimating the total electricity demand required to support full electrification of end uses at net-zero emissions. Once this endpoint is established, provinces can then work backwards to determine annual increments of generation, transmission, and distribution infrastructure needed. Scenarios should focus on system transformation, including radical shifts in supply and demand configurations, rather than incremental market-induced adjustments alone. Further, the planning should explore the implications of continued radical cost reductions in clean technologies, demand response, and efficiency measures, as well as collaboration with other jurisdictions.
- Introduce regulatory and/or market reforms to make system decarbonization and expansion a central preoccupation of all system entrants. Most provincial electricity markets are designed to limit access, limit flexible market participation, limit imports and exports, and facilitate central control. This historic approach to electricity system planning needs to shift to one of open access, flexibility, policy certainty, competition, and opportunities for market participants to operate in demand, response, efficiency, supply, storage, and financing. Governments must direct regulatory bodies to create regulated return models that incentivize achieving net zero and phase out rate structures based on sales volumes and capital expenditures.
- Ramp up incremental investments in transmission infrastructure (modernization, smart grids, distribution, renewables access, etc.) and storage to build flexible and resilient grids that can be adapted to shifting demand, and technological innovation.
- Involve electricity companies and regulators more directly in electrification of GHG emitting energy end-uses (such as transportation, space heating and cooling buildings, and industrial processes) to permit utilities to offer behind-the-meter load management systems and financial incentives to push load off peak.
- Support Indigenous power initiatives across the system, including northern and off-grid community supply projects, building efficiency, and building replacement, geothermal, skills training, and Indigenous-led finance mechanisms.
- Accelerate development and investment in new technologies, including geothermal, small modular reactors, hydrogen linkages, energy storage, and smart grid technologies.

Criteria Status

-
- Fails to meet criteria
-
- Meets in some respect
-
- Not promising
-
- Potentially meets criteria
-
- Meets criteria

7.1.6 Electricity Pathways Table

Not promising Potentially meets criteria Meets criteria			ALIGNMENT WITH CARBON NEUTRALITY	Economic		Technical			Social		
PATHWAY ELEMENTS	ROLE IN NET-ZERO SYSTEM	SIGNAL TO DECISION-MAKERS		ECONOMIC VIABILITY	ECONOMIC DEVELOPMENT OPPORTUNITY	MATURITY	OPERATIONAL FIT	INFRA-STRUCTURE AND SUPPLY CHAIN SUITABILITY	SOCIAL ACCEPTABILITY	RELEVANCE TO STAKEHOLDERS	RELATED BENEFITS AND COSTS
 Electricity Generation											
Wind (Onshore & Offshore)	<i>Priority</i> Decarbonization Pathway Expected to provide significant portion of power in a net-zero future. Canada has a vast wind resource on land and coastlines.	Deploy Support deployment with permissive regulatory environments. Educate public to reduce safety and environmental misconceptions.	 Clean power but needs storage to handle intermittent generation.	 One of the cheapest sources of new electricity, with low operating costs. Offshore wind costs remain higher. Intermittency may add costs.	 Drives jobs in manufacturing, construction, and maintenance. Boosts rural incomes through land leases and taxes. Positions Canada for export opportunities.	 Fully commercial — mature technology deployed widely. Offshore wind is less mature in Canada but proven in Europe.	 Integrates well with modern grids but challenges remain with regard to balancing and storage.	 Typically requires new transmission from wind areas to demand centres.	 Generally accepted but local opposition can be significant. Community involvement can improve acceptance. Offshore has higher acceptance.	 Aligned with federal and most provincial clean energy goals. Backed by utilities, provincial plans, the wind industry, and some landowners.	 No air pollution or water use during operation. Some issues with noise, migratory bird or bat deaths, and landscape impacts.
Utility-Scale Solar PV	<i>Priority</i> Decarbonization Pathway Costs now rival or beat new gas, and suitable land/rooftop area is ample.	Deploy Support deployment with permissive regulatory environments and R&D in cold-climate regions.	 Clean power (assuming panel lifecycle emissions are managed) but needs storage to handle intermittent generation.	 Cost-competitive with or cheaper than new natural gas generation in certain provinces. Intermittency may add costs.	 Construction and maintenance jobs. Draws private investment, boosts local tax revenues, and supports innovation and exports.	 Technology is proven. Multiple large solar farms operate in Canada. Performance in cold climates being demonstrated.	 Easy to connect at various scales, but high adoption needs better grid management.	 Most useful when paired with storage or hydro, but output varies seasonally.	 Strong support. Local concerns about land use can arise.	 Utilities for grid planning. Governments and regulators for meeting clean energy targets. Industry and communities through deployment.	 No direct emissions and improves air quality and health. Recycling of panels is immature.
Small-Scale & Residential Solar PV	<i>Potential</i> Niche Pathway Constrained by roof space and economics but still material.	Engage Upgrade local grid infrastructure to allow for smart metering. Provide financing options to assist in managing upfront costs.	 Clean power (assuming panel lifecycle emissions are managed).	 Costly without incentives but offers savings and local grid benefits. Costs are gradually declining.	 Local job creation in installation, sales, and manufacturing. Widespread adoption spurs investment within communities.	 Mature with numerous installations in Canada.	 Requires sunny, grid-connected areas or remote areas paired with batteries. Can require backup through winter.	 Integrates easily on rooftops with little land or new infrastructure needed. Some smart meters and local grid upgrades needed.	 Generally very high public acceptability with no notable opposition.	 Consumers and municipalities for cost savings and energy independence. Mixed views from utilities for grid impacts and revenue concerns.	 Clean, quiet energy source with reduced grid strain during peak times. Minimized land impact. Recycling of panels is immature.

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Building-Integrated Solar PV	Niche Pathway Typically only used in showcase buildings.	Deploy Encourage interest from developers and building owners with financing mechanisms. Provide workforce training for installation. Work to integrate micro generation with the larger electricity grid.	 Clean power (assuming panel lifecycle emissions are managed).	 Costs have dramatically declined over time. Economics can depend on regional incentives. Return on investment occurs in solar panel lifespan.	 Industry is well established. Some opportunities for local installers and domestic material production.	 Commercially Mature.	 Best on sun-exposed surfaces in space-limited urban buildings. Must be integrated into building design and meet codes.	 Supply chain is early commercial.	 Widely accepted and non-disruptive.	 Niche interest among innovation-focused stakeholders, with limited utility impact due to small scale.	 When paired with storage they provide resilience in power outages and reduce peak demand. Can sell energy back to the grid. Immaturity of recycling panels and differing lifespan from building materials.
Hydro (Reservoir)	Decarbonization Pathway Forms the backbone of Canada's decarbonized baseload power. In the future, new generation will be challenging.	Deploy Support new builds where site conditions are economical and expansions where feasible. Collaborate with Indigenous communities. Expand and improve transmission infrastructure.	 Achieves net zero. Some GHG emissions associated with initial flooding and land changes, but these can be mitigated over time.	 New generation is likely to be capital-intensive, with long payback but low operating cost. Competes well on cost per MWh if sites are appropriate.	 Large projects spur employment. Limited new dam opportunities, but exporting hydro power can generate revenue.	 Mature technology with decades of operation.	 Compatible with grid needs. Some concerns about impact of changing climate on reservoir levels.	 Large dams require extensive transmission build-out to deliver power. New projects still face logistical challenges.	 Historically mixed — strong opposition from Indigenous groups and environmentalists for new large dams. Shared equity or co-governance with Indigenous communities can improve acceptability.	 Provincial utilities for reliable baseload and storage capacity. Relevant to Indigenous communities where there are equity stakes, co-governance, and early engagement.	 Delivers clean energy balancing other intermittent renewables (water reservoir storage). However, can lead to flooding of ecosystems and Indigenous lands.
Hydro (Run-of-River)	Niche Pathway Strong fit where geography allows, yet cannot scale to a large national share.	Deploy Support buildout where site conditions are favourable. Collaborate with Indigenous communities.	 Can supplement big hydro reservoirs.	 Cost per kWh can be competitive in favourable sites.	 Regional construction and contracting opportunities for smaller firms. In Indigenous or rural areas, can spur local economic activity.	 Proven technology and mature. Deployments in Canada are ongoing but site-specific.	 Particularly suitable for remote or smaller grids.	 Integration is simple, but remote projects need new transmission lines on a smaller scale.	 Generally more accepted than large dams. Local opposition still possible from environmental groups and Indigenous communities.	 Local and Indigenous communities looking for development. Provincial utilities looking for incremental additions to the grid.	 Avoids large reservoir flooding and has a lower ecological footprint. Can have a negative impact on river health.

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Nuclear (Conventional Reactors)	Decarbonization Pathway Makes up a large share of non-emitting baseload. Development beyond current assets is limited.	Deploy Future support may be relevant in provinces with uranium supply chains or long-standing operational experience.	Zero-emission, steady power. Requires decarbonized mining and waste management to handle upstream and downstream emissions.	Costly and have a history of significant cost overruns and schedule delays. Interest where nuclear supply chains are being built out.	Supports high-skilled jobs via refurbishments. Limited new builds constrain broader economic growth potential.	Mature and reliable. Large reactors remain complex with limited recent innovation.	Fits well but requires major scale, long timelines, and is less flexible for variable renewables.	Strong nuclear supply chains and fuel security, but new builds require major infrastructure and could strain current capacity.	Mixed and region-dependent. Strong backing in some areas (e.g., ON) but persistent concerns over safety and waste in others (e.g., BC, NS).	Ontario and industry group interest. National momentum is building. Investment shifting away from large new builds.	Waste product difficult to manage and some security and safety concerns. Waste heat can have negative impacts on water quality.
Nuclear (Small Modular Reactors)	Potential Decarbonization Pathway Successful deployment has not yet occurred in Canada. Cost and schedule overruns may pose significant barriers.	Incubate Support R&D, pilots, and demonstrations. Build out supply chains capable of manufacturing SMR fuel sources and modular parts.	Zero-emission, steady power. Requires decarbonized mining and waste management to handle upstream and downstream emissions.	Unclear — still in development. Capital costs per kW are not well established.	Could drive major job creation, exports, and domestic industry growth.	Research & prototype stage. No SMR is commercially deployed in Canada yet. Proven in small test reactors.	Some SMR designs well-suited to smaller grids, industrial sites, and remote areas. More flexibility for grid operators.	Strong nuclear supply chain foundations but suitability varies by reactor design. Some SMRs require new fuel sources, modular manufacturing capacity, and upfront supply-chain investment.	Cautious but growing - strong near existing plants, mixed in remote areas, limited nationally.	Backing from federal and some provincial governments, utilities, and heavy industry. Align with decarbonization and energy reliability goals.	Waste product is difficult to manage and some security and safety concerns. Waste heat can have negative impacts on water quality.
Geothermal Power (Closed Loop, Conventional, and Deep)	Potential Decarbonization Pathway Geothermal has potential for generating net-zero electricity and heat.	Enable Support closed loop R&D as well as pilot and demonstration projects. Support longer-term development of deep geothermal.	Conventional geothermal releases some carbon dioxide. Closed loop and deep geothermal are more promising for net zero.	Not currently cost-competitive in Canada currently due to high drilling and capital costs. Potentially viable in remote areas.	Potential dependent on cost-effectiveness. Can create jobs in drilling and operations, reduced fuel imports in remote communities, and exportable tech.	Demonstration stage with one closed loop project under construction in Canada. Deep geothermal in early research.	Site-dependent and best suited to regions with accessible heat at depth. Deep geothermal has wider geographical applicability.	Can leverage oil & gas infrastructure and expertise with standard equipment and a ready supply chain.	Significant concerns of seismic activity for conventional geothermal. Support from off-grid Indigenous communities with closed-loop systems.	Western provinces, oilfield service firms, and federal innovation programs as a transition opportunity. Utilities are cautious.	Small land footprint and co-benefits (usable heat, grid stability, consistent performance, etc.). Can affect water quality if conventional geothermal is used.

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Biomass Power (Combustion)	Niche Pathway Feedstock supply is limited. Likely only economical and net-zero in very niche circumstances such as on-site power generation.	Don't Prioritize Unlikely to have a role in mainstream power generation. Watch for niche opportunities to support local or on-site power generation.	Dependent on biomass carbon intensity, land change, and transport emissions. Likely requires CCS to achieve net zero.	Costlier per kWh than wind or solar. Can be viable at small scale near cheap waste feedstock.	Opportunities in rural and Indigenous communities through local jobs and valorization of forestry residues. Limited growth potential.	Mature, proven technology widely used in Canada, especially at pulp mills.	Baseload or on-demand power in biomass-rich regions. Requires developed fuel supply chains and consistent feedstock.	Challenges around feedstock availability and industry competition.	Mixed — higher when using waste feedstocks at small, clean facilities. Concerns of sustainability, traffic, and air pollution.	Minimal interest from utilities, urban planners, and energy developers due to supply risks and higher costs.	Total lifecycle emissions are variable. Air quality pollutants can be worse than burning natural gas. Land use changes can be negative.
Gas with CCS	Bridge Pathway Can be used as a backup power source while renewables are built out or marginal balancing in a net-zero system.	Don't Prioritize Watch for local or regional power reliability issues. Could be useful as backup power.	Difficult to capture all emissions with CCS. Requires negative emissions to offset lifecycle emissions (extraction, transport, and combustion).	Costly due to CCS. Needs subsidies but may become moderately competitive for baseload power.	Protects existing energy jobs and supports regional CCS industries. Development depends on CCS demand and innovation.	Demonstration stage. Technology for post-combustion capture from gas turbines is being tested.	Best for steady-output roles. Can support flexible power with efficiency trade-offs in peaking or cycling applications.	Benefits from existing infrastructure but requires new CO ₂ pipelines and strong methane management.	Generally accepted if seen as a climate solution. Opposition remains over continued fossil fuel reliance and CO ₂ storage concerns.	Relevant to gas producers and suppliers, Alberta, and industries needing firm power.	Aids grid stability. Air quality and health issues with conventional combustion.
Coal with CCS	Dead-End Pathway Not required in Canada to reach net-zero.	Dismiss Difficult to fit with existing operations and infrastructure.	Requires carbon offsets which can be limited. Perpetuates use of materials that will have little functionality in a net-zero economy.	Very high cost and poor economics. can double the cost of electricity. More costly than renewables or gas + CCS.	Apart from CCS, which has limited growth prospects, there are better opportunities in other clean energy sectors.	Coal power plants are mature, but CCS is demonstration stage at scale, with one project in Saskatchewan.	Frequent maintenance outages observed and requires suitable geology to store CO ₂ nearby. Coal phase-out makes this operationally irrelevant.	Uses existing coal infrastructure with added capture units and CO ₂ pipelines. Coal fleet is being phased out.	Negative due to coal but moderate CCS acceptability.	Policies and utilities move to phase out coal entirely.	Issues with air quality and health from exhaust. Water demand and upstream emissions (associated with mining) are high.

			ALIGNMENT WITH CARBON NEUTRALITY	Economic		Technical			Social		
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 Grid Infrastructure and Electricity System Expansion and Improvements											
Inter-provincial Interties	Enabling Pathway Can reduce costs for decarbonization and increase grid resilience.	Deploy Encourage provincial collaboration and support interties that improve power reliability and security.	 Ensures reliability with renewable generation. Clean power can be available when local supply is limited.	 Economics can be positive depending on the projects. Funding is available but requires collaboration between parties.	 Reduces reliance on the U.S. and creates domestic jobs through infrastructure construction and maintenance. Generates domestic demand for electrical equipment manufacturing.	 Transmission technology is mature, but autarchical approach historically hampered progress.	 Provinces operate and plan resources individually. Some connections are geographically difficult with long timelines.	 New or larger transmission lines are required.	 Transmission lines often face local opposition. Shared ownership with Indigenous communities can help build support.	 Greater flexibility and reliability for users. Complexity with provincial collaboration and planning.	 Enhances power reliability in Canada and lowers decarbonization costs but requires new or expanded transmission corridors, leading to potential land disruptions.
International (U.S.) Interties	Enabling Pathway Not a priority for decarbonizing Canada. With political tensions and tariffs, economics have some risk.	Don't Prioritize Most connections and exports already established. Monitor for new export opportunities. Prioritize provincial interties.	 Offers an export opportunity for Canada's excess renewable power.	 Economics depend on the project and power demand within U.S. regions.	 Already a mature industry. Exports could grow with excess domestic power and increasing decarbonization requirements in the U.S.	 Already occurs in every province bordering the U.S.	 Requires strong collaboration between provinces and states, which can be difficult due to misalignment on goals, planning or regulations.	 Requires upgrades to existing transmission lines.	 Transmission lines often face opposition, as they require support across multiple jurisdictions. Additionally, international political tensions may heighten public scrutiny.	 Strong political tensions due to tariffs. Requires many parties to collaborate.	 Both countries benefit from increased reliability in the power grid and cleaner electricity. Some land use changes.
Grid Improvements	Priority Enabling Pathway Necessary to accommodate increased power demand. Raises grid efficiency, reliability, and resilience.	Deploy Support with stable financing. Support testing and piloting of new technologies and build out regulatory environment to include these.	 Integral to the net-zero future and its associated electrical demand across Canada.	 Cost structures vary by the type of improvement. Funding is available for some options.	 Installation and construction jobs in areas completing improvements.	 Depending on the technology, some are established (underground transmission lines) and some are emerging (smart grids).	 Proven technologies can integrate seamlessly whereas newer technologies can be complex with slow regulatory processes.	 Capacity and transmission will need to expand so that location specific needs are met.	 Improved grid reliability is seen positively but increased visible power lines may have opposition.	 Highly important to power companies for improving grid reliability, but viability depends on payment structures and government support to make business cases feasible.	 Improved reliability of electricity delivered to customers.

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Power Storage	Enabling Pathway Necessary to reach net zero where power supply is primarily supported by intermittent renewables.	Enable Support R&D so economics improve and demonstration or deployment where contexts are economically positive. Reduce regulatory hurdles for new technologies.	 Prevents excess generation going to waste and mitigates issues related to the intermittency of renewable energy sources.	 Costs vary by technology but are falling. Currently and only cost-competitive in certain contexts (remote locations or peak shaving).	 Vary by technology but opportunities and projects are emerging associated with domestic jobs.	 Some technologies (hydro reservoirs) well developed where others (grid batteries or pumped storage hydropower) at varying levels of commercialization and deployment.	 Improved grid operations, Can help with diurnal peaks. Seasonal battery storage not yet feasible or economic.	 Will require some changes to connect to the grid but should reduce the burden on infrastructure.	 Depends on technology, location and size of projects not widely implemented yet.	 Aligns with objectives to improve grid reliability, counteract peaking, and work with intermittent renewable generation.	 Counteracts the intermittency of renewable generation.
Demand Side Management	Enabling Pathway Required to reduce and manage overall power demand.	Deploy Support regional and local testing and piloting to determine the best methods and subsequent deployment.	 Reduces need for new power generation.	 Often cheaper for governments than adding additional electrical infrastructure.	 Frees electricity for industry, export, and trade.	 Implemented in some locations in Canada with mild success compared to other locations.	 Is mainly implemented through policy and regulations which may have downstream effects on operations.	 Functions with existing infrastructure and can reduce burden on the existing system.	 Resistance to utility-controlled demand. Programs need to be communicated clearly to the public.	 Can offer large savings. Seen as very favourable to utilities and large electricity users.	 Reduces environmental burden through avoided power generation and grid peak loads. Lowers energy costs.
Energy Efficiency	Enabling Pathway Required to reduce end demand for power.	Deploy Provide education to manufacturers, installers, retrofitters, and purchasers on the benefits of high-efficiency assets. Offer financing mechanisms to help with up-front costs where relevant (i.e. low-income and cold-climates).	 Reduces need for new power generation.	 Often cheaper than adding additional electrical infrastructure. Funding can vary widely by application and region.	 Job growth in many end-use sectors with retrofits and technology installations or upgrades.	 Maturity of high efficiency technologies vary by sector and application.	 Typically requires purchase of new assets.	 Can require import of new end-use technologies. Reduces burden on existing infrastructure.	 Understanding and perceptions of efficient equipment can vary widely. Higher-efficiency appliances may also carry higher up-front costs, raising equity concerns.	 Inconsistent information leads to limited understanding, causing many stakeholders to undervalue the effectiveness and deprioritize adoption.	 Cost savings for consumers and providers. Reduces environmental burden through avoided power generation and grid peak loads. Lowers energy costs.