2023 Integrated Resource Plan signpost update

Manitoba Hydro
energy for life

Reading the signs to help you navigate the energy transition

Through the process of developing the 2023 IRP, we found that the energy transition is underway in Manitoba and that there is uncertainty about the pace of this change. The 2023 IRP Road Map included signposts that were identified as leading indicators to be monitored so we could better understand the pace of change and how it might impact Manitoba Hydro and the customers we serve.

Signposts – how we recognize change

By monitoring signposts – indicators that inform on the timing, pace, magnitude, or type of changes happening in energy landscape – we can identify trends to anticipate and better understand when and how our customers' needs are changing and how we can meet them.

These signposts include:

Government actions: Energy related policy across jurisdictions can influence the pace and scale of decarbonization, leading to changes in the world of energy. Monitoring municipal, provincial, federal, and international policies helps ensure Manitoba Hydro is keeping ahead of policy changes shaping our industry.

Customer decisions: Choices customers make can impact energy demand, for things like electricity and natural gas. Monitoring these decisions helps us understand how we can continue serving these needs in the future.

Electric vehicles (EVs): Monitoring EV adoption and its impact on electricity demand will help us plan for the energy future.

Technologies & markets: Keeping on top of technologies, including those used to produce, deliver, and store energy, and changes in energy markets.

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October 2024 signpost updates – changes since the 2023 IRP

The following sections provide an overview of some of the key changes we've seen since the 2023 IRP was published in August 2023.

Government actions

Government actions – such as providing incentives or establishing regulations – at different levels can influence customer decisions and how Manitoba Hydro meets our customers' future energy needs. The following are some of the recent actions that may influence the energy sector.

Provincial government actions

- Government of Manitoba's Affordable Energy Plan: The Plan includes three main guiding principles including maximizing energy savings, increasing the supply of affordable electricity, and securing an affordable energy future. This is further outlined with seven core objectives, and 26 actions to be explored by Manitoba Hydro, Efficiency Manitoba, and the Province. A few highlights from these actions include:
  - Issuing an Expression of Interest (EOI) for up to 600 MW of Indigenous majority-owned wind generating projects;
  - Refurbishing Hydro generating stations to unlock up to 200 MW;
  - Reinvesting in aging Manitoba Hydro infrastructure to maintain reliability;
  - Developing opt-in demand management options like innovative discounted rates and investing in advanced metering infrastructure;
  - Expanding the scope of energy efficiency initiatives; and
  - Strengthening energy codes for homes and buildings.
- Manitoba Budget 2024: The Budget advances the Government of Manitoba's commitment to achieving net-zero targets by 2050 and fostering economic reconciliation with Indigenous Peoples. The Budget also includes an electric vehicle rebate, partnering with the Federal Government to fund ground source heat pumps installations, funding for an Affordable Home Energy Program, and other initiatives to reduce greenhouse gas emissions (GHGs).
- Efficiency Manitoba Mandate: Efficiency Manitoba was mandated to, in part: support the Manitoba government's climate change and net-zero commitments; deliver a new Affordable Home Energy Program; target beneficial electrification; support adoption of ground and air source heat pumps; and investigate support for district geothermal.
- Manitoba Hydro's 2023 Mandate: Manitoba Hydro was mandated to, in part: align with the government's "clean energy targets of a net-zero energy grid by 2035 and a net-zero economy by 2050"; examine options for low-carbon energy generation and storage; and work with Efficiency Manitoba to advance ground source heat pumps and energy efficiency initiatives.

Federal (Canadian) government actions

- Clean Electricity Regulations: These draft regulations aim to limit, but not prohibit, emissions from electricity generation that uses fossil fuels. The draft regulations allow "for an ongoing, though limited, role for some fossil-fuel generation past 2035, to ensure it is used where it has the greatest value for maintaining affordability and reliability." Final regulations are expected before the end of 2024.
- Clean Economy Investment Tax Credits (ITCs): A Clean Technology ITC of up to 30% is available to taxable entities that invest in qualifying technology like solar, wind or hydro electricity generation; energy storage; heat pumps; off-road EVs and their chargers; small modular nuclear reactors and more. The ITCs are available from March 28, 2023, to December 31, 2034. Legislation to implement a similar Clean Electricity ITC of up to 15% for tax-exempt entities like Indigenous entities and Manitoba Hydro is expected to be tabled before the end of 2024. Additional tax incentives are in place to support investments related to Clean Technology Manufacturing, Clean Hydrogen and Carbon Capture Utilization and Storage. Together, these tax credits may change demand for electricity from our customers while also reducing the costs of qualifying resources modelled in our Integrated Resource Plan.
- 2024 Federal Budget: The federal budget included actions such as:
  - A $5 billion Indigenous Loan Guarantee Program for natural resource and energy projects.
  - Measures aimed at creating almost 3.9 million homes in Canada by 2031, which could impact load growth.
    - City of Winnipeg will receive $122 million to build 15,867 new homes over 10 years.
    - A new Canada Greener Homes Affordability Program will support the direct installation of energy efficiency retrofits for low- to median-income households.
    - The federal government will work with other levels of government to reduce approval timelines for new major infrastructure projects.
- Federal Housing Accelerator Fund: Funding is aimed at helping communities build more homes faster, supporting affordable, diverse and climate-resilient communities. Funding conditions include changes to permitting processes (i.e., infill developments near transit corridors) which could impact electric load growth and equipment/electrical upgrades to those areas. Funding for several communities in Manitoba has been announced, including:
  - 14,000 new units over the next 3 years in the City of Winnipeg.
  - 168 new units over the next 3 years and more than 761 units over the next decade in the City of Brandon.
  - 49 new units over 3 years and 352 new units over 10 years in the Municipality of Emerson Franklin.
  - 20 new units over 3 years and 130 new units over 10 years in the Rural Municipality of Brokenhead.
  - 25 new units over 3 years and 120 units over 10 years in Sioux Valley Dakota Nation.
  - 88 new units over 3 years and 900 units over 10 years in Treaty One Nations.

- Canada Green Buildings Strategy: The federal government released the Canada Green Buildings Strategy (CGBS) in July. The stated goal of the CGBS is to decarbonize and improve the resiliency of Canada's buildings stock, while supporting affordability, job creation and economic growth. The CGBS aims to achieve this goal by accelerating retrofits, improving energy efficiency and sustainability standards for new builds, and reducing the emission intensity of space and water heating in buildings.
- Powering Canada Forward is Canada's vision for a clean, affordable, and reliable electricity system: The Federal Government published a vision to support changes to electricity systems across Canada, committing to "rapidly expanding the clean electricity grid to meet the increasing demand for electricity in order to support a net-zero economy by 2050". Building on this vision, and incorporating recommendations from its Canada Electricity Advisory Council, it plans to release a Clean Electricity Strategy before the end of 2024.
- Tariffs: The federal government introduced a 100% surtax on electric vehicles (EVs) imported from China, effective October 1, 2024. The move is part of a broader strategy to protect and grow Canada's domestic EV sector and to address concerns about unfair trade practices. It will directly impact the availability of comparatively low-cost Chinese EVs.

International government actions

United States of America (U.S.)

U.S. policy can and often does influence Canadian policy. Further, U.S. policy can influence the price that Manitoba Hydro may pay to import electricity and/or fuels from the U.S. Manitoba Hydro also exports electricity that is not needed to meet Manitobans' needs, which helps keep rates lower for Manitobans. Changing U.S. policy may impact the price Manitoba Hydro may receive for any excess electricity it exports to the U.S.

- Canada-United States Collaboration: Both countries committed to extending joint efforts to combat the climate crisis and increase economic benefits from energy-related collaboration. This includes reducing methane emissions from oil and gas, aiming for a net-zero electricity sector by 2035, and considering the social cost of greenhouse gases.
- Power Plant Regulations: In April 2024, the U.S. Environmental Protection Agency announced a suite of final rules to reduce pollution from fossil fuel-fired power plants. Under the rule, existing coal-fired power plants nationwide will have to either close by 2039 or use carbon capture and storage or other technologies to capture 90% of their emissions by 2032. New natural gas plants will have until 2035 to similarly cut their emissions, through efficient design, carbon capture, or a combination of both.
- Tariffs: In 2024 the U.S. Government introduced tariffs on several products from China, including semiconductors, EVs, batteries, critical minerals, and solar cells. The tariffs will be increased to 100% on EVs, 25% on lithium-ion batteries, and 50% on solar cells from China. The U.S. is encouraging other countries like Canada to follow suit by implementing similar tariffs. China is a currently the dominant, lowest cost manufacturer of all those products; therefore, it is possible that these tariffs could have an impact on the pace of the energy transition.

United Nations

During the 2023 Conference of the Parties to the United Nations' Framework Convention on Climate Change, countries (including Canada and the U.S.) committed to:

- "Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030."
- "Accelerating efforts globally towards net-zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century;"
- "Transitioning away from fossil fuels in energy systems in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net-zero by 2050 in keeping with the science."
- "Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero- and low-emission vehicles."

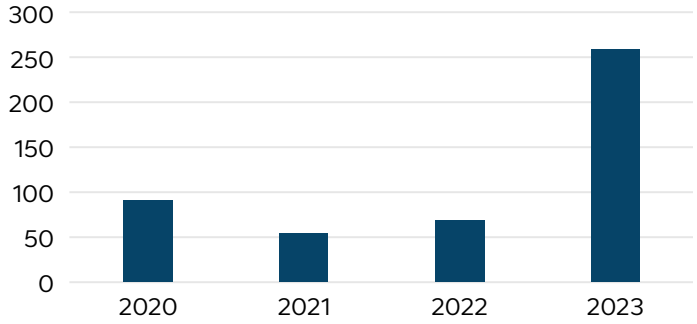
Customer decisions

Through customer and interested party engagement for the 2023 IRP, we learned all customer segments are considering energy-related decisions. These decisions may influence the pace, profile, and location of energy load changes and growth that Manitoba Hydro will need to serve. Monitoring customer decisions related to fuel switching, interconnections, energy transition trends, and solar installations is critical to understand the pace of change of the energy transition.

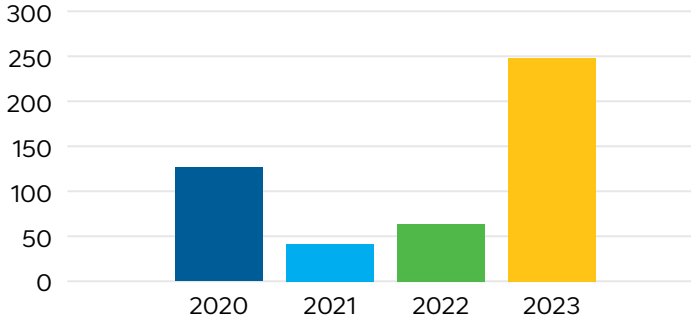
Since the 2023 IRP, we've observed several trends relating to customer decisions:

- Energy transition-related project requests increased about 233% between 2022 and 2023. This includes requests from commercial and industrial customers that are planning to pursue electrification, hydrogen production, EV charging, and/or biofuel production.
- Requests from residential and commercial customers to connect their solar systems to our grid increased approximately 289% between 2022 and 2023.

Total requested MW by year new energy transition-related project



Solar installations by year

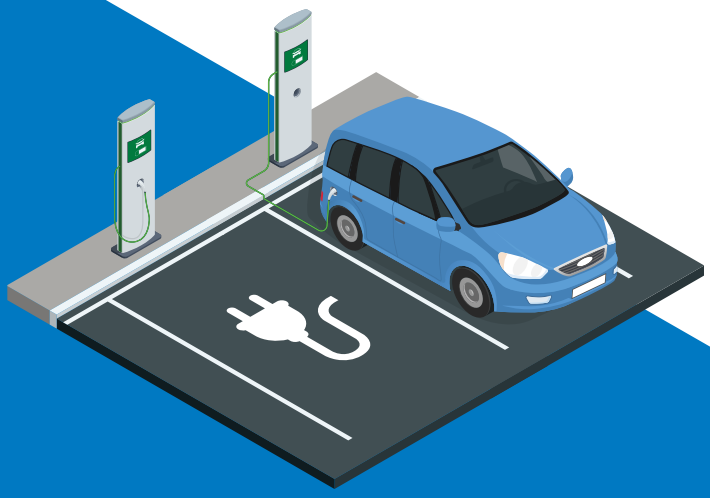


Electric vehicles (EVs)

Changes in technology, price, availability, and other factors such as reliability of charging networks will influence the pace of adoption in Manitoba. Recently, adoption in Manitoba has been accelerated by federal and provincial incentives. Where and when EV adoption occurs is important as it will require enhancements to the grid to support the distribution of these increased electricity demands.

Federal, and recently introduced provincial, incentives have accelerated EV adoption in Manitoba.

- Using Statistics Canada's New motor vehicle registrations: Quarterly data visualization tool, battery electric (BEV) and plug-in hybrid electric (PHEV) vehicles accounted for 5% of all new motor vehicles registered in Manitoba in the 2nd quarter of 2024 as compared to 3.2% and 1.9% of 2nd quarter sales in 2023 and 2022 respectively. The 736 new EV registrations in the 2nd quarter of 2024 represent the highest number of EV registrations in any quarter since Statistics Canada began collecting data and continues an upward trend in adoption of EVs in Manitoba
- In December 2023, Canada's Electric Vehicle Availability Standard (Standard) was published. The Standard requires light-duty vehicle manufacturers to meet national annual EV sales targets. The targets begin for the 2026 model year, with a requirement that at least 20% of new light-duty vehicles (passenger cars, SUVs, and light-duty trucks) offered for sale in that year be electric vehicles, including plug-in hybrids. The requirements increase annually to 60% by 2030 and 100% for 2035. The targets align with what was modelled in the 2023 IRP in Scenarios 3 and 4.
- Manitoba's 2024 budget introduced an EV incentive of $4,000 for new vehicles and $2,500 for used vehicles. This can be used by customers in combination with the federal EV incentive of up to $5,000. It is expected these rebates will accelerate EV uptake in Manitoba.
- The Government of Manitoba's Affordable Energy Plan also included an action related to expansion of public EV charging in Manitoba, which could accelerate EV adoption.
- The number of EV models available to purchase in 2026 are expected to double from the number available when work began on the 2023 IRP. This is anticipated to result in lower priced EVs coming to market. This is according to research based on auto manufacturers announcements, and included in the Electric Power Research Institute's Consumers Guide to Electric Vehicles (2023).



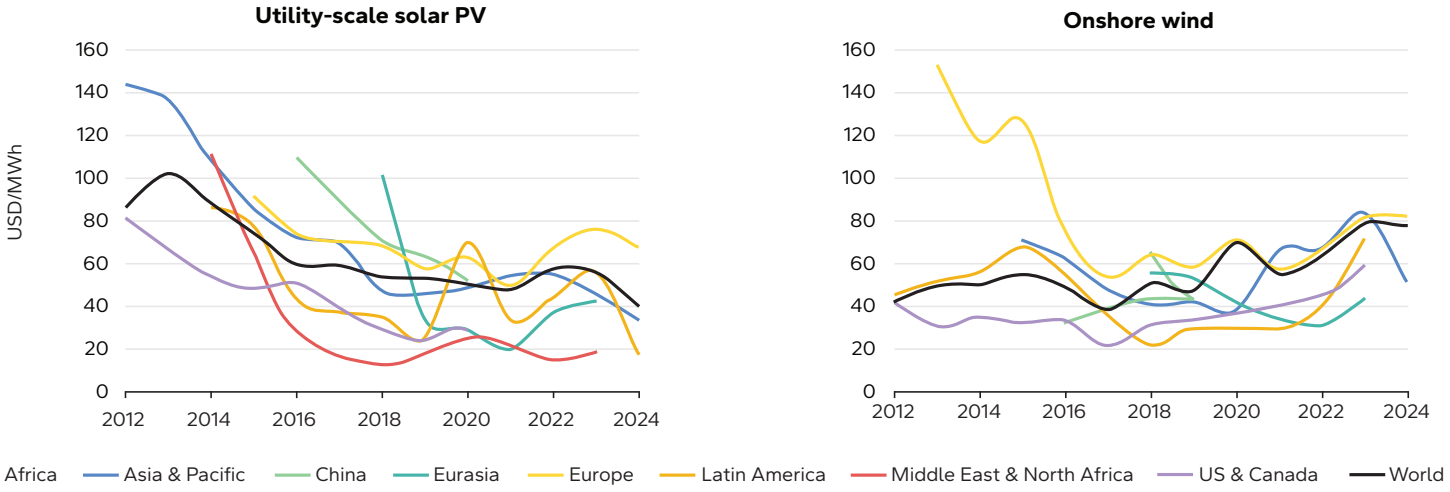
Technologies & markets

This signpost aims to monitor topics and trends related to resource supply options, energy market profiles, pricing, and emerging technologies. Monitoring and analyzing these activities provides input, and guidance that can assist with future energy planning.

Technologies

- Over time, resources like wind and solar have achieved significant cost declines. The International Energy Agency's Renewables 2024 report demonstrates that since the 2023 IRP the cost trend of these resources has been more volatile and has risen in some cases. Factors such as labour, tariffs, supply chain challenges and inflation contributed to these increases.

Weighted average prices by region for utility-scale solar PV and onshore wind, 2012–2024



Over time, resources like wind and solar have achieved significant cost declines.

Source: International Energy Agency. Renewables 2024. https://iea.blob.core.windows.net/assets/45704c88-a7b0-4001-b319-c5fc45298e07/Renewables2024.pdf

- Within Canada, several jurisdictions or utilities are considering the use of Small Modular Reactors, including SaskPower, New Brunswick Power, and a collaboration between Alberta and Ontario.
- In May 2024, the Ontario Government concluded the "largest battery storage procurement in Canada's history", procuring 1,784 MW of additional energy storage from ten projects ranging in size from 9 to 390 MW. These projects had an average price per MW

of $672.32 which represents a 24% decrease in price from the previous round of procurement in 2023. Nine of the ten projects also have 50% or more Indigenous ownership.

- The International Energy Agency (IEA) released its IEA 2024 Renewables Outlook in October 2024. For the first time, this Outlook includes a chapter dedicated to exploring the growth of "renewable fuels – including liquid, gaseous and solid bioenergy, as well as hydrogen and e-fuels" within the global energy system. The IEA anticipates that bioenergy will account "for almost all renewable fuel growth through 2030. Bioenergy use expands the most in industry, followed by transport and then buildings. Modern bioenergy is less expensive than hydrogen and e-fuels..."

- In May, 2024, the Government of Canada released a Progress Report on Hydrogen Strategy for Canada. It highlights progress that has been made to develop both production of hydrogen in Canada as well as demand for hydrogen within Canada and abroad. This includes the approximately 80 "low-carbon hydrogen production projects" that have been announced as well as the eight hydrogen hubs that have formed or are forming. While many projects have been announced, currently there are only "13 low-carbon hydrogen production facilities in operation in Canada, comprising 6 electrolytic facilities and 7 projects that have adopted carbon capture to lower the emissions of traditionally carbon intensive hydrogen production."

Markets

- Canadian utilities are seeking to greatly expand their generating capacity as they project significant increases in their customer's energy needs.

  - In March, 2024, the Independent Electric System Operator released its IESO Annual Planning Outlook that anticipates, "demand will, on average, increase two per cent a year over the coming decades, from 154 TWh in 2025 to 245 TWh by 2050." This growth is driven primarily by economic and population growth as well as industrial electrification and growth. "Daily electricity use patterns are also changing as consumers embrace electric vehicles, industry begins to electrify their processes and local greenhouses continue to increase agricultural production. The latest forecast shows Ontario transitioning from a summer-peaking region to a dual-peaking region beginning in 2030."

  - The Alberta Electric System Operator released their AESO 2024 Long-Term Outlook that forecasts higher growth in electricity demand from its 2021 Outlook, explaining that "This difference is largely driven by elements of the energy transition including accelerated adoption of EVs and electrification of building heating and cooling, which have a more pronounced long-term effect on load growth..." The compound annual growth rate in its latest forecast to 2043 is 1.2% compared to 0.4% from 2022 to 2041 in its previous 2021 Outlook.

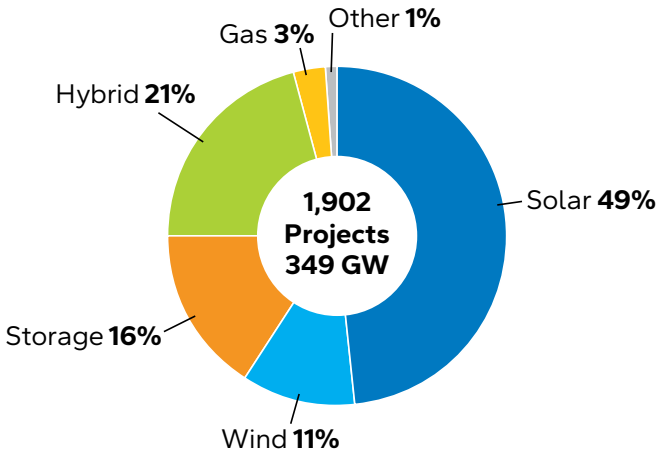
- To serve this increased demand, most Canadian utilities are focused on a future resource mix with low operating emissions. It is unclear whether this cumulative demand will put upward pressure on the cost to acquire new generating resources, as there could be competing demand on supply chains and for skilled labour to bring new resources online. The following are examples of Canadian utility development plans:

  - In September 2024, BC Hydro closed their first 'call for power' in 15 years with a request for proposal (RFP) to acquire 3,000 GWh/year of new renewable generation by as early as 2028. BC Hydro's RFP requires "projects that have a meaningful First Nations partnership component."

- Hydro Quebec announced their development plan, with a cost of up to $185 billion, to reinvest in their existing system, acquire 10,000 MW of new wind, and add 3,800 MW to 4,200 MW of new hydropower by enhancing existing generating stations and developing new facilities. In addition, Hydro Quebec states that a priority of the development plan is to "facilitate the financial or economic participation of Indigenous communities in new infrastructure projects."
- NB Power has issued a Request for Expressions of Interest for new power sources. They are inviting proposals for wind, solar, and tidal power to produce up to 220 MW of electricity and up to 50 MW of energy storage. The goal is to have these projects operational by July 2027.

- MISO Transmission Build-out: The Midcontinent Independent System Operator (MISO), of which Manitoba Hydro is a coordinating member, is developing a greater than $17B transmission build-out, described as a 765 kV "interstate highway system for electricity". This is expected to reduce market prices across MISO, particularly those related to transmission congestion, where prices have become inflated due to transmission 'bottlenecks' which prevents more affordable electricity from being able to reach customer loads. This is part of a larger $30B transmission development proposal.
- By 2042, the Midcontinent Independent System Operator's (MISO's) installed capacity is projected to be more than double its current levels, with a significant shift towards energy sources like wind and solar. The increasing use of these resources is related to a decline in their cost, as the cost of new wind and solar has made existing coal-based electricity generation less competitive and resulted in an acceleration of retirements of coal generation. While coal is in decline, natural gas generation capacity is not expected to decline due to its ability to quickly provide critical dispatchable capacity when wind and solar are not producing.
- MISO's recent 'Organization of MISO States' survey indicates that in the coming years, due to significant increases in new loads and the retirement of fossil fuel generation, particularly coal-based generators, there needs to be a "dramatically accelerated pace of new [generation] build" to not have demand exceed supply within MISO. If this issue is not resolved, it could put upward pressure on electricity prices in MISO.
- The MISO current active interconnection queue (e.g., new resources requesting to connect to the MISO grid) has grown exponentially compared to 2021 with the biggest rise seen in solar, hybrid and storage. These projects are expected to come online over the next few years.

MISO active interconnection queue as of June 2024



Note – Hybrid: combines generation and storage technologies (ie: Solar + Battery)

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