2025 Integrated Resource Plan

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Manitoba Hydro
energy for life

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1. Land Acknowledgement

Manitoba Hydro has a presence right across Manitoba – on Treaty 1, Treaty 2, Treaty 3, Treaty 4 and Treaty 5 lands – the original territories of the Anishinaabe, Anishininew, Cree, Dakota, and Dene peoples and the National Homeland of the Red River Métis.

We also acknowledge the ancestral lands of the Inuit in northern Manitoba.

We acknowledge these lands and pay our respects to the ancestors of these territories. The legacy of the past remains a strong influence on Manitoba Hydro's relationships with Indigenous communities today, and we remain committed to establishing and maintaining strong, mutually beneficial relationships with Indigenous communities.

2. Message from President/CEO

Planning today to ensure reliable, affordable energy tomorrow

The global energy transition is reshaping how electricity is produced, delivered and consumed— and Manitoba is not immune to its impacts.

As demand grows, Manitoba Hydro is projecting a shortfall in firm electricity capacity by the end of 2030, potentially reaching 600 megawatts—nearly the output of the Keeyask generating station. This shortfall is driven by increasing electrification and the need to adapt to changing energy use patterns.

The bulk of Manitoba's energy will continue to be provided by the existing system we rely on each day. However, that system is aging. It requires significant sustaining investment to ensure it can continue to operate effectively. That includes our natural gas system for heat, which provides 1.4 times the capacity of the electrical system on our coldest days—at 1/40th of the debt—and accounts for only 5 per cent of total provincial GHG emissions. This is a system that will serve Manitoba well into the future, but it also needs additional care and maintenance alongside investments in our electrical assets and infrastructure.

Investment is also needed to meet future demand, which is expected to grow beyond what the existing system can provide. Planning for the energy transition and investing appropriately is essential to ensuring we can manage risk and continue to meet energy needs, particularly during Manitoba's coldest winter weeks.

That's why we're acting now. Our 2025 Integrated Resource Plan (IRP) is a key step in preparing for tomorrow's energy needs. It provides a road map to support our province's long-term energy needs, adding almost 30 per cent more electricity capacity to Manitoba Hydro's supply, and puts us on a path to a net-zero future. Working hand-in-glove with our enterprise planning processes and guided by our mission to meet the energy needs of

our customers, the 2025 IRP is a crucial step toward realizing our vision of empowering Manitoba's future with affordable, reliable energy.

The 2025 IRP outlines a 10-year development plan, as well as learnings, near-term actions, and signposts to help us navigate through the energy transition. The plan prioritizes customer-side solutions, including Efficiency Manitoba programs, demand response, and curtailable rates programs. When new resources are needed, the IRP recommends a balanced portfolio that includes majority Indigenous-owned wind generation, battery storage, enhanced hydro generation, and natural gas combustion turbines. These resources reflect Manitoba Hydro's commitment to achieving a net-zero electricity grid by 2035. The combustion turbines, for example, will be fuelled by low-carbon fuels as they become readily available, and any remaining emissions will be offset with carbon credits. At the same time, these new resources will enable the electrification of other sectors, such as transportation and industry, as part of Manitoba's transition to net-zero.

Our immediate next steps include implementing the IRP roadmap—starting with near-term actions related to the recommended development plan and continued preparation for the next IRP.

Implementation will involve detailed planning for each investment, securing necessary approvals and environmental licences, and integrating new resources into the grid. At the same time, we will further integrate our strategic planning processes within Manitoba Hydro overall as we advance planning across our electricity and natural gas systems to support future resource decisions beyond the 10-year horizon.

We will also monitor changes in Manitoba's energy landscape, tracking shifts in supply and demand, assessing progress, and identifying when updates or new analysis are needed. Developing an IRP is not a one-time exercise. It's an ongoing, adaptive process. Like many utilities, Manitoba Hydro will update our IRPs and other integrated planning processes regularly, guided by our province's unique needs and the signposts identified in this plan.

Completing the IRP is a significant milestone, but it's only one part of our broader commitment to meeting Manitoba's long-term energy needs

and supporting a pathway to net zero. Beyond the IRP, we continue to strengthen reliability by investing in the renewal and modernization our generation, transmission, and distribution assets, maintaining strong interconnections with neighbouring utilities in Canada and the United States, and optimizing our system performance through integrated enterprise planning processes, disciplined asset management and operational improvements.

Throughout this journey, we remain committed to collaboration, alignment and transparency to all involved in the energy planning process. This plan is the result of thousands of hours of work, including collaborative analysis, modelling, and engagement. It reflects feedback from customers, governments, Indigenous organizations, and environmental groups. We will continue working closely with the Province of Manitoba, Efficiency Manitoba, the Public Utilities Board, Indigenous nations, our customers, and the broader energy community. Together, we can build an energy future that is reliable, affordable, and sustainable for all Manitobans.

Allan Danroth
President & CEO
Manitoba Hydro

3. Executive Summary

3.1. 2025 Integrated Resource Plan

Manitoba Hydro's 2025 Integrated Resource Plan (IRP) outlines a strategic road map for navigating the province's energy transition. Building on the foundation of the 2023 IRP, this updated plan addresses evolving electricity and natural gas needs while deepening our understanding of what matters to customers and interested parties engaged throughout the planning process.

Recommended & alternative development plans to 2035
A sequence of actions and investments that meet future energy needs, providing flexibility and alternatives.

Learnings
What we've learned throughout the IRP development process.

Near-term actions
What we need to do over the next five years.

Signposts
Indicators of changes in the energy landscape.

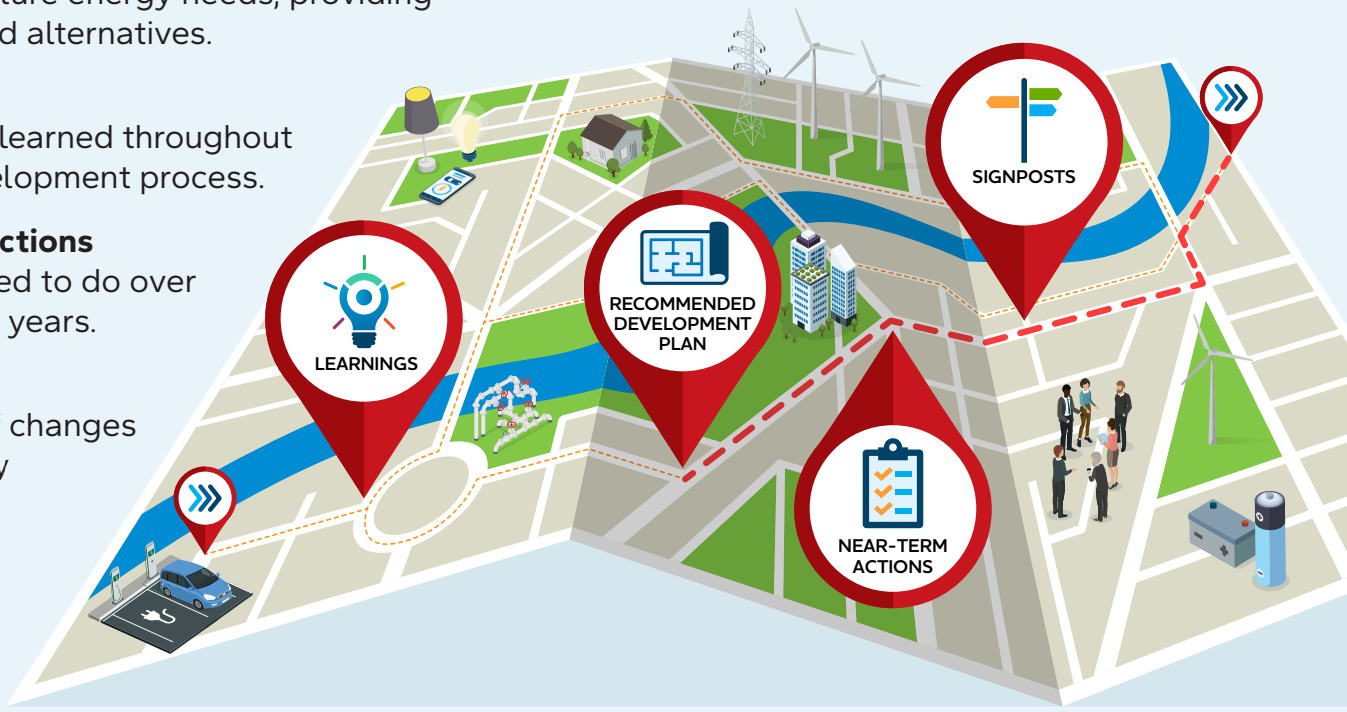

Figure 1 – 2025 IRP Road Map

The plan reflects Manitoba Hydro's mandate to deliver safe, reliable, and affordable energy services, incorporating guidance from the Government of Manitoba's 2023 Mandate Letter to the Manitoba Hydro-Electric Board and preparing for a net-zero electricity grid by 2035 and a net-zero economy by 2050. It balances cost-efficiency, reliability, environmental stewardship, and socio-economic benefits, including economic reconciliation.

Net-zero is a target, or a descriptor of a target, in which greenhouse gas (GHG) emissions from defined activities are netted to zero on an ongoing cumulative basis by GHG removals from the atmosphere. This may be physical emissions reduction or removal, or credits representing such reductions.

Developed over 18 months, the IRP is built on thousands of hours of modelling, analysis and evaluation, using data-driven insights to guide planning decisions. It was shaped by feedback from Manitoba Hydro customers and interested parties including governments, Indigenous organizations, and environmental non-governmental organizations (NGOs).

While the main report provides a high-level overview, detailed technical data in the appendices and a standalone engagement report offer deeper insights into the planning and engagement process.

3.1.1. Purpose of the 2025 IRP

Manitoba Hydro is responsible for providing safe, reliable energy to all Manitobans. A foundational assumption in our IRP is that our existing system continues to deliver energy and capacity, and that we make the investments necessary to sustain that system. However, the utility's existing supply is limited, and analysis indicates that new electricity capacity supply is needed by the end of this decade (2030). Analysis also indicates that new dependable energy will likely be required by 2032.

Developing an IRP is a common utility practice across North America, tailored to each utility's unique context. Once completed, an IRP provides a road map to guide investments and other energy planning activities over the period studied in that IRP.

Building on work done in Manitoba Hydro's 2023 IRP—work that clearly identified the need for new sources of capacity and energy by the end of the decade—the 2025 IRP was undertaken as a crucial step in formulating a recommended development plan to meet these needs.

Implementing new sources of electricity capacity and energy supply takes time, and for Manitoba Hydro, the implementation of these new resources must follow an approved development plan. The Manitoba Hydro Act also requires that the utility's IRP be informed by engagement with Manitobans.

The 2025 IRP was initiated to meet these legislated requirements and emerging needs. The resulting recommended development plan will guide future investments that will enable Manitoba Hydro to continue providing safe, reliable and affordable energy throughout the province.

3.1.2. IRP Development Process

The development of Manitoba Hydro's 2025 IRP followed a structured, five-step process and included: setting direction; developing key inputs and scenarios; modelling, analysis and evaluations; formulating a preliminary recommendation; and, finalizing the IRP. The IRP development process incorporates input from customers, interested parties, and the Manitoba energy planning community. This process is designed to support long-term planning for safe, reliable, and cost-effective energy delivery across the province and builds on the foundation established by the 2023 IRP. It is a repeatable process that ensures the plan remains responsive to changing conditions and stakeholder input, while providing a clear framework for future planning iterations.

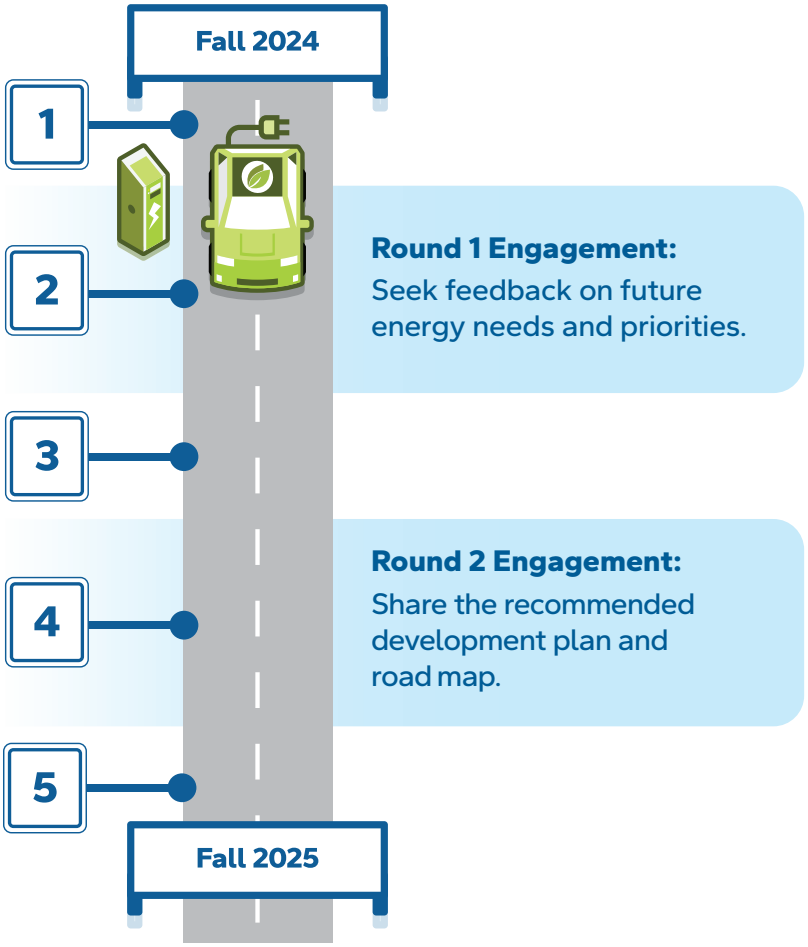

Figure 2 – IRP Development Process

3.2. 2025 IRP Road Map

To support Manitoba Hydro's long-term planning and readiness for the energy transition, the 2025 Integrated Resource Plan (IRP) introduces a comprehensive road map. This road map guides our strategic direction and planning efforts.

Recommended & alternative development plans to 2035
A sequence of actions and investments that meet future energy needs, providing flexibility and alternatives.

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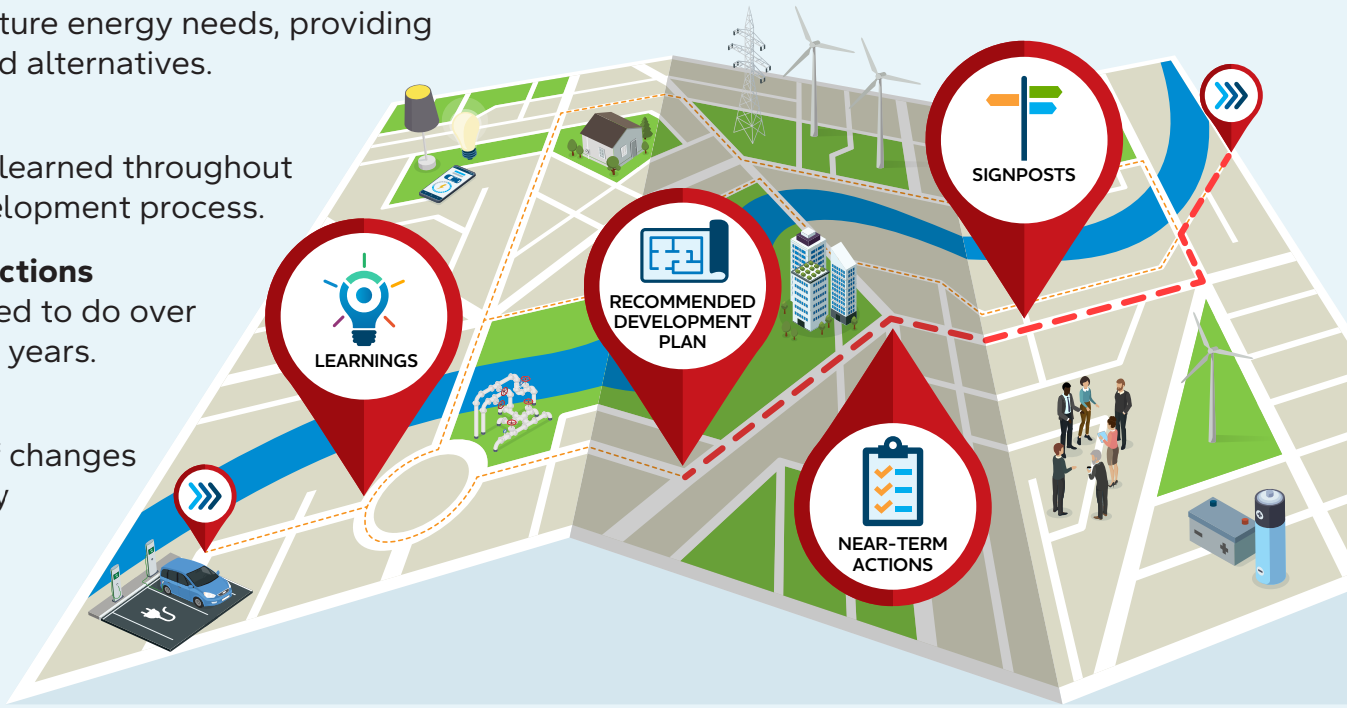


Figure 3 – 2025 IRP Road Map

3.2.1. Elements of the Road Map

The 2025 IRP road map outlines the steps needed to prepare for Manitoba's energy future. Developed through a transparent, engagement-driven process, it is the outcome of Manitoba Hydro's scenario-based planning process to ensure affordable, reliable, and safe energy for customers.

The road map is a directional guide for next steps informed by public input and ongoing monitoring of factors influencing the energy industry but does not provide prescriptive, step by step instructions.

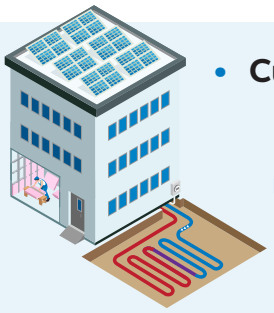
The road map includes five components:

1. **Recommended Development Plan:** a portfolio of activities and investments that will meet energy needs in Manitoba.
2. **Alternative Development Plan:** another option showing viable but less preferrable solutions.
3. **Learnings:** key insights gained from modelling, analysis, customer research, and engagement.
4. **Near-Term Actions:** Manitoba Hydro's commitments over the next five years to implement the plan and support ongoing planning.
5. **Signposts:** Indicators in the energy landscape (e.g., policy, technology, market trends) that guide future planning and signal when a new IRP may be needed.

3.2.2. Recommended Development Plan

The recommended development plan is a high-level strategic plan that adds 1,760 megawatts (MW) of accredited capacity over 10 years. It efficiently increases our total capacity on the electric system from approximately 6,200 MW to approximately 7,200 MW, —an increase sufficient to get and stay ahead of the energy transition in Manitoba. The recommended development plan meets net-zero grid by 2035 requirements and supports a path to a net-zero economy in Manitoba by 2050.

Resources in the recommended development plan include:



- **Customer-side solutions totalling 860 MW**, including:

  - **A projection of Efficiency Manitoba's 2025–28 planning analysis to achieve its legislated energy savings targets extended to 2050 (Efficiency Plan Projection)** and **additional efficiency programing** designed to achieve **450 MW** and **100 MW** of capacity savings respectively by 2035;

  - **Demand response and curtailable rate** solutions targeting **310 MW** of capacity savings by 2035;

- **Wind power totalling 600 MW**[1] added by 2035;
  The recommended development plan is also reliant on the natural gas system continuing to be reliable and available.

- **Enhancements to existing hydropower** to achieve a minimum of **25 MW** of capacity by 2029, with continued exploration of further opportunities;

- **Utility scale battery storage for up to five MW** by 2034;

- **Natural gas/biomethane-fuelled combustion turbines**, totalling **750 MW** by 2030.

Natural gas: critical to meeting Manitoba's energy needs

While electricity keeps things running, natural gas keeps us warm. Accounting for only 5 per cent of provincial emissions, natural gas is a key component to residential heating in Manitoba. When compared to electrified heating, the natural gas system is cost-effective and efficient, providing= 1.4 times the capacity of the electrical system on our coldest days at 1/40th of the debt. Continuing to use the efficient natural gas system will allow our finite electricity supply to be used for more impactful emission reductions across other sectors in the province (for example, in transportation).

1 *600 MW of installed wind capacity is equivalent to 120 MW of accredited capacity.*

The 2025 IRP's recommended development plan also includes IRP-specific non-generation investments to enable resources and future system development. These include:

- **Electrical transmission and distribution upgrades** to support new generation and load growth.
- **Gas supply and distribution upgrades** to support new natural gas generation.

The recommended development plan is also reliant on the natural gas system continuing to be reliable and available.

3.2.3. Alternative Development Plan

In addition to the recommended development plan, Manitoba Hydro has developed an alternative development plan. Including an alternative is standard practice in resource planning, as it demonstrates the range of resources available and provides options if the recommended plan cannot be fully realized. There is one alternative development plan included in the 2025 IRP road map as a next-best option to the recommended development plan. The alternative plan differs in several key areas:

- It includes less additional programming from Efficiency Manitoba,
- It includes fewer enhancements to existing hydropower facilities,
- It relies more heavily on wind energy and natural gas or biomethane-fueled combustion turbines.

The alternative is an acceptable development plan that offers similar benefits to the recommended development plan while less subject to risks associated with customer uptake of energy efficiency programs and more subject to implementation risks associated with wind energy. This alternative is technically feasible but was not selected as the recommended plan has a stronger alignment with Manitoba's Affordable Energy Plan.

Feasible Resource Options	Recommended Development Plan (MW)	Alternative Development Plan (MW)
Efficiency plan projection	450	450
Demand response including curtailable rate program	310	310
Additional energy efficiency programs	100	0
Total customer side solutions	**860**	**765**

Feasible Resource Options	Recommended Development Plan (MW)	Alternative Development Plan (MW)
Total customer side solutions	860	765
Wind[2]	120	140
Battery storage	5	5
Enhancements to existing hydropower	25	0
Combustion turbine fuelled by natural gas	750	850
TOTAL BY 2035 (approx. MW, accredited capacity)	1760	1760

Table 1: Recommended Development Plan

3.2.4. Learnings

Figure 4 – How the learnings are generated

2 120 MW of accredited capacity of wind is equivalent to 600 MW of installed wind

IRP learnings are fundamental to the road map and inform the near-term actions and signposts. They are rooted in studied and documented outcomes. They summarize key insights gained through the process of developing the IRP, from engagement and customer input and feedback, modelling and analysis, and studying potential and implemented government policies. There are five learnings within the 2025 IRP road map which summarize key insights gained through the process of developing the plan.

1. Virtually all utilities in North America are subject to increased demand for capacity and the need for grid sustainment and modernization to meet energy needs. With inherent long lead times for construction of new resources, utilities must pursue uninterrupted development to get and stay ahead of the energy transition. Course changes spurred by policy would risk our short-term ability to meet energy needs.

2. All plans have risks and trade-offs. Modern integrated resource plans, like Manitoba Hydro's, include analysis that goes beyond the utility's perspective to understand and assess these trade-offs.

3. Given the 2030 need date, there are limited options to serve demand.

4. The recommended development plan preserves reliability and enables an affordable pathway to net-zero in Manitoba by including the strategic use of natural gas by industry and by customers for home heating, while enabling impactful forms of Manitoba GHG reductions and efficiency gains in non-utility sectors like transportation.

5. An ongoing collaborative approach that includes all Manitobans is needed to plan and achieve net-zero. Manitoba Hydro's role as an energy utility is one of many coordinated efforts.

3.2.5. Near-Term Actions

Near-term actions (NTAs) are the next steps to plan and implement the recommended development plan and prepare for the next IRP. They may present opportunities for collaboration with external parties and will be further detailed in future as NTAs are undertaken.

There are 12 NTAs in the 2025 IRP road map, grouped into two themes, to be completed over the next five years. These themes include actions focused on implementing the recommended development plan and actions encompassing the ongoing energy planning to prepare for a range of potential futures, considering how the energy transition may impact demand for electricity and natural gas.

Near Term Action – Theme #1: Implement the development plan

1. Collaborate with Efficiency Manitoba to support the development and delivery of their next Plan, including legislated and additional targets per this IRP.
2. Implement demand response and curtailable rate programs, in collaboration with Efficiency Manitoba. Advance enabling technologies such as advanced metering infrastructure.
3. Procure Indigenous majority-owned wind through a call for power.
4. Execute plans for combustion turbines fuelled by natural gas/biomethane.
5. Implement enhancements to existing hydropower and continue to pursue additional opportunities.
6. Implement utility-scale battery pilot project.
7. Pursue near-term import/export market options as available.

Near Term Action – Theme #2: Prepare for the next IRP and continue ongoing planning

8. Monitor the development plan implementation and load growth (e.g., tracking energy efficiency, resource project schedules, and supply-demand balance) and make resource adjustment as needed
9. Explore alternative fuels, credits, and Manitoba-based offsets to combustion turbine GHG emissions and further investigate the direct use (blending or full replacement) of alternative fuels, such as hydrogen.

10. Continue to improve and optimize our integrated resource planning processes.
11. Pursue additional items in the Affordable Energy Plan, such as the clean heat strategy, electric vehicle charging, and ground source heat pumps and district heating.
12. Advance planning for resources with potential to be recommended in the next IRP, including small modular reactors, new hydropower, and energy storage solutions.

3.2.6. Signposts

Signposts are leading indicators that Manitoba Hydro monitors to help identify trends in the energy transition and anticipate when and how our customers' energy needs are changing and how those needs can be served. Specifically, signposts are designed to:

- **Indicate the type, timing, pace, and magnitude of change** in energy demand and supply.
- **Inform the implementation of near-term actions and the recommended development plan**, ensuring responsiveness to evolving conditions.
- **Enable ongoing monitoring and reporting**, supporting planning and helping determine when changes to underlying IRP assumptions are substantial enough to warrant a new IRP.
- **Align with risk monitoring efforts**, particularly those associated with implementing the development plan.

To support the 2025 IRP, Manitoba Hydro has identified three signposts that signal significant shifts in the energy landscape. These three signposts have been identified as having the greatest potential impact on Manitoba's energy future:

Figure 5 – Three signposts of the 2025 IRP

Government Actions

Energy-related actions at the municipal, provincial, national, and international level can significantly influence the pace and scale of change. Monitoring these actions ensures Manitoba Hydro can work to respond to legislative and regulation changes that have potential to shape the energy industry.

Customer Decisions

The choices our existing and future residential, commercial, industrial, and institutional customers make, such as adopting new technologies (like self-generation), changing consumption patterns, or shifting fuel sources, affect demand for electricity and natural gas. Tracking these decisions helps Manitoba Hydro anticipate and meet future energy needs.

Technologies and Markets

Advances in energy technologies and shifts in energy markets influence how energy is produced, delivered, stored, and priced. Staying informed about these developments supports strategic planning and investment decisions.

These signposts will be continuously monitored and integrated into Manitoba Hydro's planning processes to ensure the IRP remains relevant and responsive to emerging trends and uncertainties.

3.3. Conclusion

Manitoba Hydro is planning today to ensure reliable, affordable electricity and natural gas for tomorrow. The 2025 Integrated Resource Plan (IRP) road map includes a recommended 10-year development plan, key learnings, near-term actions, and signposts—all designed to help Manitoba Hydro navigate the energy transition and meet energy needs while achieving a net-zero electricity grid by 2035.

Manitoba is facing a projected shortfall in firm electricity capacity by the end of 2030. Planning now to implement new resources is essential to ensure Manitoba Hydro can meet peak demand in the future, especially on Manitoba's coldest days. In addition to implementing new resources, we must also continue to invest in our existing electric and natural gas systems to mitigate risks and help prevent decline in system performance.

Meeting electricity demand is key to driving economic growth and promoting the well-being of our province. The 2025 IRP development plan prioritizes customer-side solutions like Efficiency Manitoba's programs, demand response and curtailable rates programs, which help to defer the cost of installing new resources while promoting socio-economic benefits for the province. It also provides for the addition of new generating infrastructure and enhancements to existing assets. Together, these resources form part of a balanced approach to maintaining reliability and affordability while supporting Manitoba's path to net-zero.

Transparency is a guiding principle in our IRP development process. In the months and years following the release of this IRP report, we will continue to share information about our progress on implementation and outcomes; continue to engage with Manitoba's energy planning community; and, distribute updates about new analysis or material changes. The timing of these communications will be guided in part by the pace and nature of change in the energy system.

While uncertainty remains around how the energy transition will unfold, the 2025 IRP builds on the foundation established with Manitoba Hydro's first IRP, completed in 2023. It strengthens the utility's planning framework and further establishes a repeatable and adaptive process for future resource planning. Manitoba Hydro will continue to evolve our approach to ensure it reflects emerging trends, incorporates public input, and supports a bright energy future for all Manitobans.

4. Introduction

4.1. Introduction

Like many regions in the world, Manitoba is undergoing an energy transition.

The 2025 Integrated Resource Plan (IRP) studies how the energy needs of Manitobans are changing—and how they will continue to change— and outlines the steps Manitoba Hydro needs to take to meet those needs.

Building on the foundation of Manitoba Hydro's first IRP, released in 2023, the 2025 IRP provides a road map for the utility's future, including a recommended development plan. A defining feature of the 2023 IRP was the inclusion of customers' voices throughout the process of planning for future electricity and natural gas needs – a commitment that continues in the 2025 IRP. The 2025 IRP road map includes five components:

- **Recommended development plan** – the sequence of actions and investments that are needed to meet future energy needs within the next 10 years and achieve a net-zero electricity grid by 2035;
- **Alternative Development Plan** – the next best alternative to the recommended development plan;
- **Learnings** – the knowledge Manitoba Hydro has gained from the IRP process;
- **Near-term actions** – the actions to be taken over the next five years;
- **Signposts** – the changes in the energy landscape Manitoba Hydro will continue to monitor moving forward, so we can adapt the plan if necessary.

Collectively, the road map provides a guide for Manitoba Hydro in monitoring, preparing for and responding to the changing energy landscape.

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A sequence of actions and investments that meet future energy needs, providing flexibility and alternatives.

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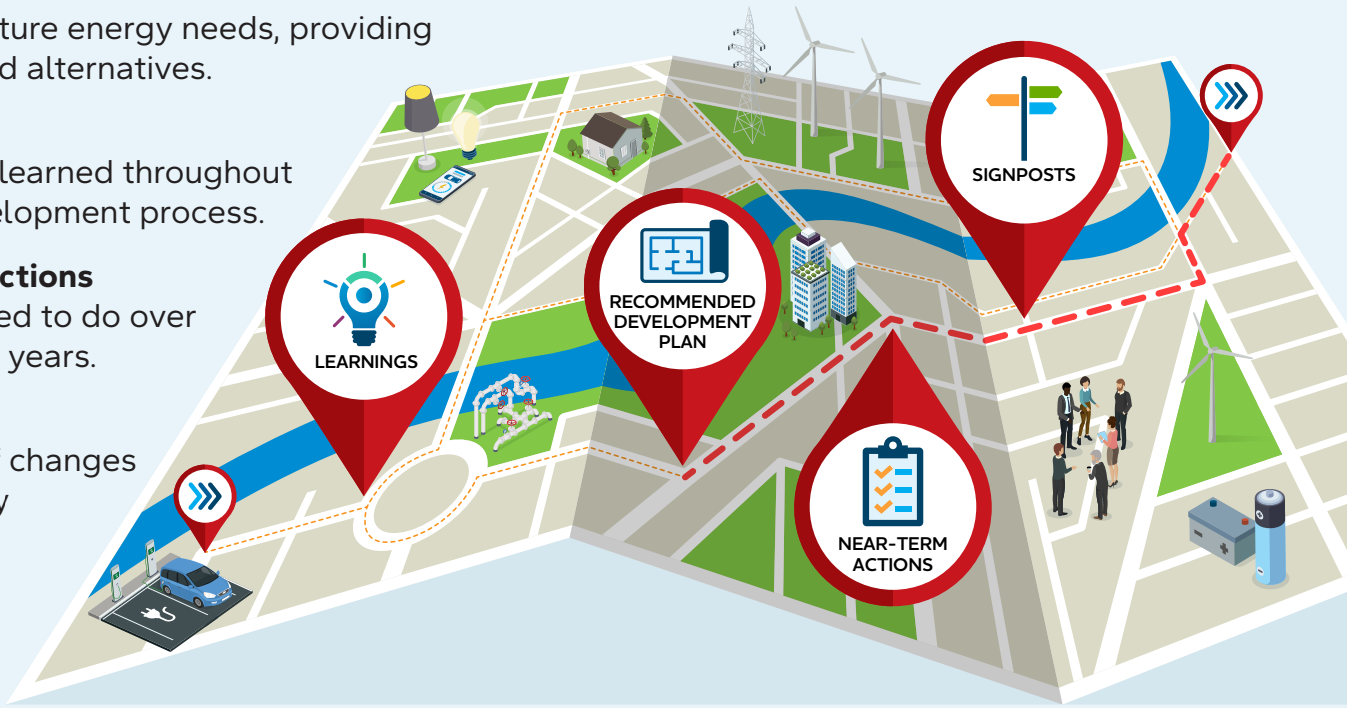


Figure 6 – 2025 IRP Road Map

The 2025 IRP was developed to align with Manitoba Hydro's mandate to deliver safe, reliable energy services at a fair price. Other considerations, such as the Government of Manitoba's 2023 Mandate Letter to the Manitoba Hydro-Electric Board[3], were also incorporated into the development of the plan. As part of the technical analysis, the IRP explored lower cost options to meet potential future needs, assuming current levels of safety and reliability would remain unchanged. It also reflects the directives for Manitoba Hydro to achieve a net-zero electricity grid by 2035 and support Manitoba's net-zero economy by 2050 goals.

3 https://www.manitoba.ca/asset_library/en/executivecouncil/mandate/hydro_mandate_letter_2023.pdf

The outcomes of the 2025 IRP aim to balance customer priorities, including reliability, affordability, protecting the environment, and promoting socio-economic benefits – particularly those related to economic reconciliation. Recognizing the uncertainty of future energy demand, the road map is designed to be flexible and resilient, capable of adapting to changes in the demand for energy.

This 2025 IRP report provides a high-level summary of work completed over more than 18 months, from the initial stages of planning to the development of a road map outlining the path forward, including data and discussion most relevant to supporting the details of the 2025 IRP road map. Engagement with customers and interested parties was an important part of this work. The 2025 IRP Engagement report walks through the IRP development process, noting where engagement feedback was used. Full technical details are included in the appendices, and the standalone engagement report has also been published with full details of our engagement activities and feedback shared with Manitoba Hydro.

Look for this icon throughout the report to see how engagement feedback informed each step of the development process.
For more details see the full **Engagement Report**.

4.2. Manitoba Hydro Overview

Manitoba Hydro is a provincial Crown corporation providing reliable electricity and natural gas – energy that powers our province and supports economic growth. As outlined in the Manitoba Hydro Act, Manitoba Hydro is governed through the Manitoba Hydro-Electric Board, whose members are appointed by the Government of Manitoba.

Our mission is to meet the energy needs of our customers with a view to empowering Manitoba's future with affordable, reliable energy.

The bulk of electricity generated in Manitoba is from hydropower produced at 16 hydroelectric generating stations on the Nelson, Winnipeg, Saskatchewan, Burntwood and Laurie rivers, with a combined capacity of approximately 6,400 MW. Manitoba Hydro also purchases power from three wind farms.

Our natural gas system is critical for heating in the province, and supplies approximately 1.4 times the capacity of the electrical system for heating on Manitoba's coldest days.

As one of the largest integrated electricity and natural gas utilities in Canada, Manitoba Hydro is uniquely positioned for the combined study of natural gas and electricity solutions to prepare for the energy transition and help build a better future for all Manitobans. While other jurisdictions may be planning for decarbonization of existing electric assets, our past investments in reliable, dispatchable hydroelectricity, interconnections to other energy markets, and natural gas distribution systems create a solid foundation from which to start.

4.2.1. Who We Serve

Manitoba Hydro serves over 632,000 customers across the province with electricity and over 300,000 customers in southern Manitoba with natural gas. We also trade electricity within wholesale markets in the midwestern United States and Canada. Electricity exports generate revenue that keeps rates in Manitoba lower than they would be otherwise, while also helping to displace greenhouse gas (GHG) emissions in jurisdictions where fossil fuels are a primary source for generation.

4.2.2. Our Commitment to Indigenous Relations

As a predominantly hydroelectric utility, our past and our future are inextricably intertwined with Indigenous Nations and communities who have a strong cultural and spiritual connection to the lands and waters since time immemorial. We acknowledge the impacts of our projects and operations and are committed to working collaboratively to strengthen and improve our relationships with Indigenous Nations and communities as Manitoba's energy future unfolds. We support the advancement of reconciliation in Manitoba and will continue to engage with Indigenous Nations and communities in our future energy planning process and community-led energy planning.

5. Purpose of the 2025 IRP

5.1. Why do the 2025 IRP?

Manitoba Hydro is responsible for supplying Manitobans with safe, affordable and reliable energy. Developing an IRP is common practice for utilities across North America, and each utility's approach reflects a unique combination of customer needs, service territory, the energy products offered to customers, existing assets and policy drivers. The 2023 Integrated Resource Plan, Manitoba Hydro's first, was a two-year exploration of the factors driving change in the Manitoba energy landscape and confirmed that the energy transition has started in Manitoba. The energy transition, and particularly decarbonization, is increasing demand for electricity—and Manitoba Hydro's supply is limited.

Energy planning is ongoing at Manitoba Hydro and since the 2023 IRP, we have already seen changes in the energy landscape. Updated analysis shows that new electricity capacity supply could be needed by the end of 2030 and new dependable energy could be needed in fiscal year 2031/32. It takes time to implement solutions, and the pathway to approving and implementing those solutions is through an approved development plan. Development of an IRP, informed by engagement, is a requirement of the Manitoba Hydro Act and a needed step to inform investments needed to serve future demand.[4] Therefore, to meet our need for new capacity by the end of the decade and ensure we do not fall behind the continuing energy transition, the 2025 IRP was started with the intent of producing a recommended development plan that will allow Manitoba Hydro to meet or energy needs to 2035.

4 *The Manitoba Hydro Act* https://web2.gov.mb.ca/laws/statutes/ccsm/h190.php?lang=en

5.1.1. 2025 IRP Objectives and Scope

Building on findings from the 2023 IRP, and knowing that new generation resources or additional energy savings would be needed by the end of 2030, a primary objective of the 2025 IRP was to arrive at a recommended development plan. The ten-year development plan timeframe was selected to ensure confidence in data and analysis and align with legislated requirements regarding Manitoba Hydro's IRP. Another objective was to study how Manitoba Hydro could achieve a net-zero electricity grid by 2035 and support a net-zero economy by 2050 in Manitoba. With consideration of other policy, mandates, and regulation, including Manitoba's Affordable Energy Plan, Manitoba Hydro sought to understand how the utility could best consider the many trade-offs involved in recommending a development plan that would effectively meet the evolving energy needs of Manitobans.

What is a development plan?

It outlines the steps Manitoba Hydro will take to meet future energy needs. It may include building new energy sources, infrastructure, and developing programs to manage energy use under peak demand.

An IRP is founded on broad technical analysis that studies a range of potential energy futures. A study period of 25 years was set for the 2025 IRP, starting in 2025 and ending in 2050. This time period was chosen to meet the objective of studying a net-zero economy by 2050 in Manitoba. While the 2025 IRP studied a net-zero economy by 2050 in Manitoba, the 2025 IRP is not in itself a study of how best to reduce greenhouse gas emissions but rather how potential emission reduction actions may impact the electricity and natural gas that Manitoba Hydro provides. This helped to ensure that the recommended development plan reflected decisions that needed to be made now to support long-term emissions reduction goals and offset needs.

Providing transparency in the energy planning process and including customer and interested parties' feedback was key in achieving IRP objectives.

The 2025 IRP considered alignment with policy across all levels of government and subject matter, including Clean Electricity Regulations, Manitoba's Affordable Energy Plan, and more. More details are provided in **Appendix 4 – Policy Landscape.**

Given analysis in an IRP is forward-looking, the 2025 IRP does not include analysis of current or past operations, projects, practices, and decisions. Similarly, the 2025 IRP does not include specific community or regional needs and solutions but rather takes a macroscopic view of Manitoba's needs. Due to their high dependence on market conditions and the 2025 IRP's need to align with goals for energy sovereignty, building new interconnections with neighbouring utilities for importing electricity in place of building new resources to serve demand was not part of this IRP's scope. The 2025 IRP assumes that all existing import and export contracts are not renewed once they expire.

5.2. 2025 IRP Development Process

The development of Manitoba Hydro's 2025 IRP followed a structured, five-step process designed to support long-term planning for safe, reliable, and cost-effective energy delivery across the province. This builds on the foundation established by the 2023 IRP and represents a repeatable and continuously improved process that ensures the IRP remains responsive to changing conditions and engagement feedback, while also providing a clear framework for future planning.

The IRP development process incorporated input from customers, interested parties, and the Manitoba energy planning community.

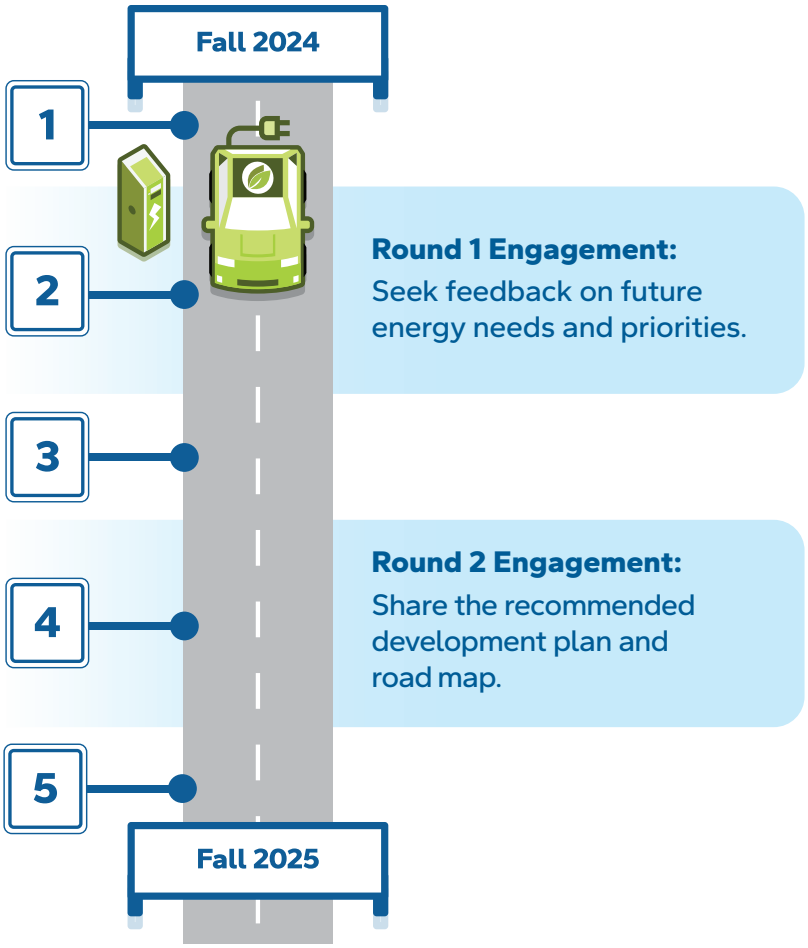


Figure 7 – 2025 IRP Process

Step 1: Setting Direction

This foundational step established the overall direction for the 2025 IRP, identifying its objectives and scope.

Step 2: Develop Key Inputs and Scenarios and Round 1 Engagement

During this step, Manitoba Hydro gathered information and data from a wide variety of sources to establish the key inputs and develop scenarios used in the IRP. Evaluation metrics were also established in this phase prior to modelling, analysis and evaluations. Engagement feedback was sought on these elements before they were implemented in the IRP. The work completed in this step was carried throughout the 2025 IRP analysis, directly impacting the outcomes of the IRP.

- **Key inputs** include load projections and resource options strategies. These inputs have significant uncertainty and impact on the analysis. Key inputs are underpinned by planning assumptions.
- **Scenarios** represent an energy future. They are a likely combination of a specific load projection and a resource options strategy.
- **Evaluation metrics** were established to be applied to the modelling and analysis outputs.

Step 3: Modelling, Analysis, and Evaluations

This step involved several components. Specialized computer modelling tools were used to perform capacity expansion planning and to simulate Manitoba Hydro's ability to meet future electrical and natural gas energy needs under each scenario. Analysis considered generation planning criteria, peak demand management, energy efficiency opportunities, infrastructure needs, reliability and the existing system and future resource options. Transmission, distribution and natural gas infrastructure criteria, as well as the existing system, were also integrated into the study analysis as inputs and into collaborative reviews of the results. Outputs were then evaluated using the established metrics to identify trade-offs and inform the recommendation.

During this step, Manitoba Hydro also held information sessions with interested parties to share key findings that would help inform the preliminary recommendations.

Step 4: Preliminary Recommendations and Round 2 Engagement

Based on results of modelling and evaluation, as well as risk and financial analysis, a road map was prepared. Round 2 engagement was held in December 2025 to share the road map, including the recommended development plan.

Step 5: Final Reporting

The 2025 IRP road map was finalized and the IRP Report and Engagement Report finalized for publication.

This structured process ensures that the IRP is robust, transparent, and informed by diverse perspectives. It provides a foundation for future planning cycles and supports Manitoba Hydro's ability to successfully navigate the energy transition.

5.2.1. Engagement Overview

Look for this icon to see throughout the report to understand how engagement shaped the 2025 IRP. Please refer to the **Engagement Report** for further details.

Engagement was a core part of developing the 2025 IRP. Following *International Association for Public Participation*[5] practices throughout the process supported openness and transparency in energy planning and enabled the consideration of diverse perspectives from customers and interested parties, all of which helped improve project outcomes, ongoing planning and future analyses.

Engagement Objectives for the 2025 IRP

- Providing meaningful opportunities for influence within the process and to inform decision making.
- Providing inclusive opportunities to participate, recognizing different types of knowledge and interest.

5 https://www.iap2canada.ca/Pillars

- Fostering dialogue of diverse points of view to facilitate knowledge sharing and informed decision making.
- Being transparent and providing clarity on the development and outcomes of the IRP and how feedback was considered and incorporated.
- Being responsive and accountable to feedback shared during engagement.

Engagement Methods and Opportunities for the 2025 IRP

Engagement methods were chosen to meet audiences where they are and to support participation at their desired level of involvement throughout the process. The goal was to foster responsive, two-way dialogue with customers and interested parties to help inform the IRP.

There were several opportunities to participate in the development of the 2025 IRP. Two rounds of engagement were originally planned in Fall 2024 and Fall 2025. Each round was designed to inform key stages of the development process.

During the course of developing the 2025 IRP, adjustments were made to the original planned engagement opportunities. A mid-project information session was added in Summer 2025 to share key interim findings from the modelling and analysis.

- **Round 1** – Develop planning inputs: Between October and December 2024, we gathered information to understand customers' and interested parties' future energy needs and priorities. We also sought feedback to inform the evaluation metrics used to compare options and inform the recommendation of a development plan.
- **Project Information Sessions:** In July 2025, several project information sessions were held to share progress on the 2025 IRP and highlighted key observations from the development process as work progressed to consider options to meet Manitoba's growing energy needs.
- **Round 2** – Get feedback on road map: In December 2025, we shared the 2025 IRP road map, including the recommended development plan, with interested parties and customers to gather feedback and hear perspectives.

5.2.2. Actions to ensure quality

To ensure a quality IRP that is rooted in data and evidence and then shaped by engagement, the following strategies were employed. There is extensive expertise in energy planning and engagement within Manitoba Hydro accumulated over decades of planning for supply and delivery of electricity and natural gas. Development of the 2025 IRP included considerable collaboration and coordination across Manitoba Hydro to draw on and build on existing planning processes and expertise. Manitoba Hydro also engaged two consultants—Energy & Environmental Economics (E3) and Urban Systems Ltd.—to provide independent technical expertise and objective third-party perspectives.

E3 is a consulting firm with offices in Canada and the United States with experience in reviewing and developing IRPs for both electric and natural gas utilities in Canada and the United States. E3 was hired by Manitoba Hydro in January 2025 to review the IRP development process, the results of the modelling, analysis, and evaluation, and to advise on the development of the road map.

Manitoba Hydro also engaged Urban Systems Ltd. to support the engagement process. Urban Systems is an interdisciplinary community consulting firm based with 18 locations across western Canada. They come with a deep understanding of the materials Manitoba Hydro was engaging on and their services include navigating municipalities, provincial governments and agencies, and Indigenous communities through complex issues and the development of new processes, policies and regulations. Having an external party to support engagement also provided a neutral intermediary to communicate between parties as needed and facilitate sessions.

IRP processes are established to evolve, mature and to implement continuous improvement. Understanding this, Manitoba Hydro continually monitors and reviews other utilities' IRPs and their development processes in pursuit of best practices. In addition to seeing how other IRPs are developed, the content and outcomes of other utilities' IRPs, particularly those of Canadian utilities in similarly cold climates, can productively inform Manitoba Hydro's planning.

6. The 2025 IRP Road Map

The 2025 Integrated Resource Plan (IRP) introduces a comprehensive road map to support Manitoba Hydro's long-term planning and readiness for the energy transition. This road map outlines five key components that collectively guide our strategic direction and planning efforts. Those components are: recommended and alternative development plans to 2035; learnings; near-term actions; and, signposts.

Recommended & alternative development plans to 2035
A sequence of actions and investments that meet future energy needs, providing flexibility and alternatives.

Learnings
What we've learned throughout the IRP development process.

Near-term actions
What we need to do over the next five years.

Signposts
Indicators of changes in the energy landscape.

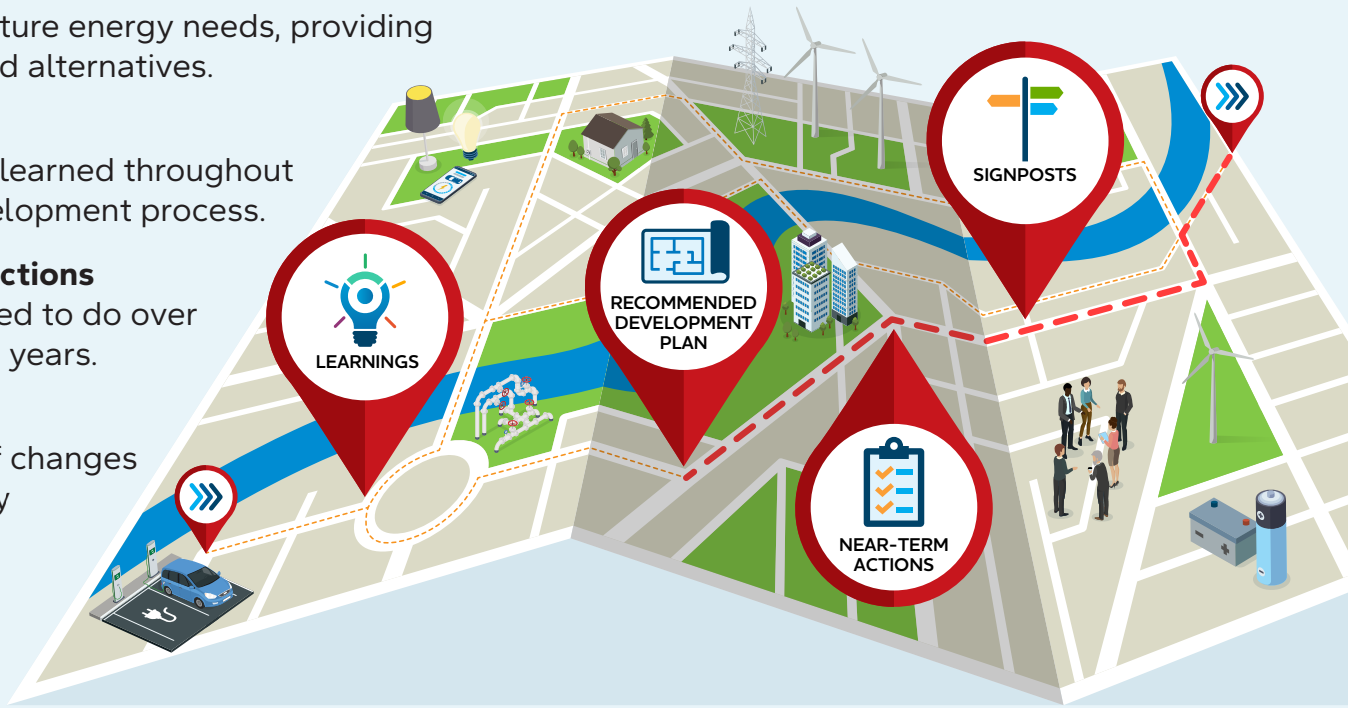


Figure 8 - 2025 IRP Road Map

The details of each of these components are described in the following sections.

6.1. Recommended & Alternative Development Plans

The recommended development plan is a high-level plan for the combination and quantity of investments to 2035 for meeting Manitoba's future energy needs. Designed to guide decision-making and future planning activities, rather than serve as a detailed implementation blueprint, it outlines what investments are needed, by when, and in what quantities and sequence.

The alternative development plan is another way to meet future energy needs that could be implemented if the recommended development plan is not executable in full.

Importantly, the recommended development plan and alternative development plan are not:

- Standalone strategies for reaching a net-zero economy in Manitoba by 2050;
- Commitments to build any individual major new facility (or regulatory submissions for such projects);
- Plans with project-specific details, like detailed engineering or siting plans;
- Solutions to all energy-related challenges facing Manitoba;
- Exhaustive lists of all investments Manitoba Hydro must make to effectively serve future energy needs.

These exclusions reflect the significant amount of work that will follow the approval of the 2025 IRP, including project-specific evaluations, regulatory procedures, continued engagement and other processes.

An IRP is not intended to result in project- or resource-specific plans. Following the approval of an IRP, more work is required to both implement the plan and fully address the broader energy system issues that are outside the scope of the IRP. The particulars of each of these issues and their solutions will require deep involvement with parties external to Manitoba Hydro—including regulators, governments, businesses, and customers. This IRP is a strategic Manitoba Hydro planning document, not a holistic and prescriptive solution to all of Manitoba's energy planning needs.

The goal of the IRP development process was to arrive at a development plan that balanced many different considerations, mandates, and directives.

Our 10-year development plan is a sequence of actions and investments that:

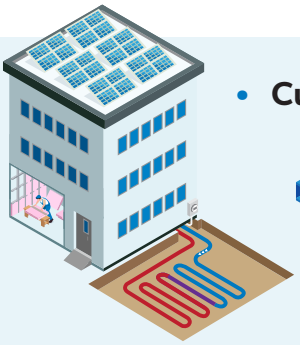
- Meet Manitoba's future energy needs, including sufficient capacity for peak firm electricity demand and a continuous, sufficient supply of energy;
- Consider trade-offs of factors important to Manitobans, gathered and verified through public engagement on both the 2023 and 2025 IRPs, including reliability, cost, environmental and socio-economic impacts;
- Provide flexibility for meeting load growth and considers risks to new and existing supply;
- Enable a net-zero grid by 2035 and support a pathway to a Manitoba net-zero economy by 2050;
- Align with Manitoba's Affordable Energy Plan.

Evaluation metrics were developed early in the IRP development process. Our engagement sought feedback on the metrics and themes of metrics. Details are outlined in the full **engagement report**.

This approach to energy planning decision-making acknowledges that energy planning in Manitoba must consider a broad set of values and risks, and that trade-offs between these values and risks are inherent in any long-term strategy.

6.1.1. 2025 IRP Recommended Development Plan

The recommended development plan is a high-level strategic plan that adds approximately 1,760 MW of accredited capacity, meets requirements for a net-zero grid by 2035, and supports a path to a net-zero economy in Manitoba by 2050. Resources in the recommended development plan include:



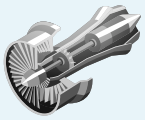
- **Customer-side solutions totalling 860 MW**, including:
  - **Efficiency Plan Projection** and **additional efficiency programs** designed to achieve **450 MW** and **100 MW** of capacity savings respectively by 2035;

  - **Demand response and curtailable rate** solutions targeting **310 MW** of capacity savings by 2035;

- **Wind power** totalling **600 MW**[6] by 2035;

- **Enhancements to existing hydropower** to achieve a minimum of **25 MW** of capacity by 2029, with continued exploration of further opportunities;

- **Utility scale battery storage** in the amount of **approximately five MW** by 2034;



- **Natural gas/biomethane-fuelled combustion turbines**, totalling **750 MW** by 2030.

6 600 MW of installed wind capacity is equivalent to 120 MW of accredited capacity.

As detailed in the **Engagement Report Appendix** we heard Manitobans want to be involved in the solution:

- Residential customers are interested in tracking and managing their energy use.
- Interest in energy storage and heat pumps is increasing.
- Communities' energy goals included a focus on self-generation opportunities including energy storage, and energy efficiency upgrades.

The 2025 IRP's recommended development plan also includes specific non-generation investments to enable resources and future system development. These include:

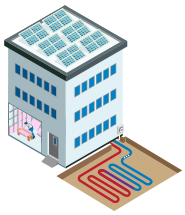
- **Electrical transmission and distribution upgrades** (not including work to renew the existing the High Voltage Direct Current (HVDC) system, Manitoba Hydro's Grid Modernization and Advanced Metering Infrastructure initiatives, or other sustaining capital).
- **Gas supply and distribution upgrades** to support new natural gas generation but not including sustaining/improvement capital which may be informed by the IRP but are identified through other planning.

Financial analysis and estimates indicate the recommended development plan's capital investment cost by 2035 is approximately $3.4 billion, approximately $300 million more than the alternative development plan.

The recommended development plan also keeps Manitoba Hydro compliant with federal Clean Electricity Regulations, maintains Manitoba Hydro's generation emissions profile through to 2035, with more than 99.8 per cent of generated electricity coming from non-fossil-based sources, and will achieve a net-zero electricity grid by 2035.

Resource Roles in the Recommended Development Plan

Each resource plays a specific role and carries specific risks. Manitoba Hydro's portfolio approach allows for shared mitigation strategies across risks and also allows flexibility in response to changing circumstances.



Customer Side Solutions – Efficiency Plan Projections, Additional Efficiency Programming and Demand Response

Energy efficiency plays a leading role in the recommended development plan by reducing the need for electricity capacity from other resources. This role includes 450 MW of capacity savings through the Efficiency Plan Projection extended to 2035 to meet a 1.5 per cent energy savings target[7] along with a further 100 MW from additional programming. These additional programs will focus on measures such as enhanced home insulation, support for ground source heat pumps, thermal energy storage, and customized solutions for industrial customers. This efficiency-first approach aligns with Manitoba's Affordable Energy Plan.

We heard through engagement that efficiency solutions are a desirable solution to manage increased energy demand, but additional incentives, policy and regulation are likely needed to encourage equitable uptake of these solutions. For more information, please refer to the **Engagement Report**.

Additionally, demand response and curtailable rates programs offer a flexible way to reduce peak capacity needs by encouraging customers to temporarily lower their electricity usage during peak periods. However, new programming will require regulatory approval for implementation, which introduces risk to assumed costs and timing of capacity savings. Strong customer participation in customer side solutions is also required, and low uptake could significantly impact capacity outcomes. Further, realizing the full capacity savings possible through these programs will also require new capabilities, technologies, and tools, such as advanced metering infrastructure (AMI).

To mitigate these risks, the development plan recommends a measured, efficiency-first approach to ensure increase in capacity savings are achievable.

Manitoba Hydro will advance enabling technology deployment, work with customers to design effective programs, and monitor progress on the design, uptake, and effectiveness of efficiency programming in meeting the required demand reductions.

7 *https://web2.gov.mb.ca/laws/statutes/ccsm/e015.php*

Wind Generation

Wind generation diversifies the resource mix and offers low-cost energy while supporting broader socio-economic goals. Specifically, Indigenous majority-owned wind projects align with the Affordable Energy Plan, supporting economic reconciliation and community partnerships.

Wind energy is subject to procurement risks and must be complemented by dispatchable resources. Its location can also affect the environmental impact, scheduling, and cost effectiveness of an installation. Manitoba Hydro has published a wind exploratory study to guide procurement and interconnection planning and will use project-specific insights to manage regulatory and scheduling risks going forward.

We heard throughout engagement there is a high level of interest in developing wind energy. We also heard the development of wind resources is important in advancing economic reconciliation.

Enhancements to Existing Hydropower

Enhancements to Manitoba Hydro's existing hydropower facilities can add electricity capacity without expanding the system's physical footprint. These enhancements align with the Affordable Energy Plan's goal to maximize existing infrastructure.

However, enhancements to existing hydropower require long lead times and the work to implement these enhancements necessarily results in a capacity reduction while the work is underway, potentially requiring temporary replacement capacity. This resource's economic viability depends on

The recommended development plan identifies 25 MW of enhancements to Manitoba Hydro's existing hydropower facilities, but the system has potential for up to 180 MW of additional capacity. We heard through engagement that our customers feel it's important to focus on sustaining aging infrastructure while also building to accommodate future growth and development so the economics of this potential is continually studied.

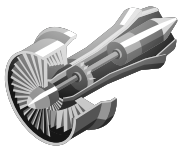
coordination with other maintenance and overhaul work that is planned outside of the IRP. Manitoba Hydro will continue evaluating these opportunities and incorporate them into its Asset Management Plan to ensure efficient execution.

Utility Scale Battery Storage

While Manitoba Hydro is capable of significant energy storage through its hydroelectric system, short-term, utility-scale battery storage has potential as a flexible, dispatchable capacity resource. The development plan recommends a five MW pilot project designed to test the effectiveness of utility-scale batteries in Manitoba. Pilot projects can help Manitoba Hydro understand the potential benefits of future, larger installations that could complement other intermittent resources.

There is a desire to see the consideration of new and emerging resource options, including energy storage. There is also interest in understanding how energy storage could support the viability of different generation resources.

Given that Manitoba Hydro is capable of energy storage through its hydroelectric system, battery storage must be tested for effectiveness. Batteries can also compete with demand response solutions because both flatten the demand curve, discharging during peak hours and charging during off-peak hours. By opting for a relatively small installation and monitoring performance, Manitoba Hydro can assess the role of battery storage without significant risk exposure.



Natural Gas/Biomethane-Fuelled Combustion Turbines

Combustion turbines fuelled by natural gas or biomethane provide Manitoba Hydro with a reliable source of dispatchable capacity, ideal for meeting peak demand and serving as a contingency resource during droughts, extreme weather, or other system disruptions. The addition of combustion turbines in Manitoba will have virtually no impact on Manitoba's emissions—99.8 per cent of Manitoba Hydro's generation will continue to be from non-fossil fuel sources through to 2035. This is because combustion turbines only add to GHG emissions when they are used to generate electricity, and these combustion turbines are projected to be run between 0.5 and five percent of the time.

Though they are not installed with the intent to be used for every-day energy, their inclusion in the development plan plays a big role in ensuring year-round reliability through 2035.

Combustion turbines face risks related to global supply chain pressures, procurement timelines, and potential changes in unit sizing based on manufacturer availability. There is also a reputational risk associated with adding a fossil fuel-based resource, which could be perceived as deviating from Manitoba's path to net-zero, despite an expected low utilization factor for the turbines themselves. To mitigate these risks, Manitoba Hydro is securing manufacturing slots early to maintain its position in the procurement queue and incorporating contractual off-ramps to allow for deferral or cancellation if full capacity is not needed. Manitoba Hydro is also exploring carbon offsets, credits, and the integration of emerging fuel sources as they become viable to mitigate reputational and environmental risks associated with combustion turbines.

Analysis that combustion turbines added to our system are expected to be used minimally on average. They will function primarily as a backstop resource in the system, such as during times of drought, extreme weather, or during other system contingencies. While running combustion turbines with natural gas will produce some greenhouse gas emissions, this is mitigated by how little the units are expected to run on average.

In discussion with the Technical Advisory Committee (refer to the IRP engagement report for details), it was acknowledged that using combustion turbines under emergency conditions, drought, extreme cold snaps or for meeting peak demand in the near-term was acceptable, if developed in parallel with non-GHG emitting resources, energy storage options, and efficiency programs.

Manitoba Hydro is also exploring carbon offsets, credits, and the integration of emerging fuel sources as they become viable to mitigate reputational and environmental risks associated with combustion turbines.

6.1.2. Alternative Development Plan

The 2025 IRP road map proposes an alternative development plan as a next-best option to the recommended development plan. Including an alternative is good practice in resource planning, as it provides options if the recommended plan cannot be fully realized. The alternative plan differs in several key areas:

- It includes less additional programming from Efficiency Manitoba,
- It includes fewer enhancements to existing hydropower facilities,
- It relies more heavily on wind energy and natural gas or biomethane-fueled combustion turbines.

Although this alternative approach results in a lower overall cost, it is less subject to risks associated with customer uptake of energy efficiency programs, but it doesn't offer the same socio-economic benefits as provided by the recommended development plan. The recommended plan invests more in measures like heat pumps, insulation, and expanded Efficiency Manitoba programming, recognizing the value of implementing these solutions now. If elements of the recommended plan do not materialize, the alternative plan provides two viable options for meeting capacity needs: adding more wind resources and expanding combustion turbine capacity. This alternative is technically feasible, also enabling a pathway to net-zero mandates, but was not recommended because the recommended development plan has stronger alignment with Manitoba's Affordable Energy Plan.

Feasible Resource Options	Recommended Development Plan (MW)	Alternative Development Plan (MW)
Efficiency plan projection	450	450
Demand response including curtailable rate program	310	310
Additional energy efficiency programs	100	0
Total customer side solutions	**860**	**765**

Feasible Resource Options	Recommended Development Plan (MW)	Alternative Development Plan (MW)
Total customer side solutions	860	765
Wind[8]	120	140
Battery storage	5	5
Enhancements to existing hydropower	25	0
Combustion turbine fuelled by natural gas	750	850
TOTAL BY 2035 (approx. MW, accredited capacity)	1760	1760

Table 2: Recommended Development Plan and Alternative Development Plan

6.1.3. Arriving at a Recommended Development Plan

The process to arrive at a recommended development plan include many different steps and analysis, as show by the diagram below. These steps included:

- Using the scenario and sensitivity modelling and analysis results to identify **feasible resource options**.
- **Identifying potential development plans** based on the modelling and analysis results.
- Creating a **short list of potential development plans** by evaluating against a build-out target and by applying evaluation metrics.
- **Arriving at a recommendation** by completing other analyses, including risk and financial analyses.

8 120 MW of accredited capacity of wind is equivalent to 600 MW of installed wind

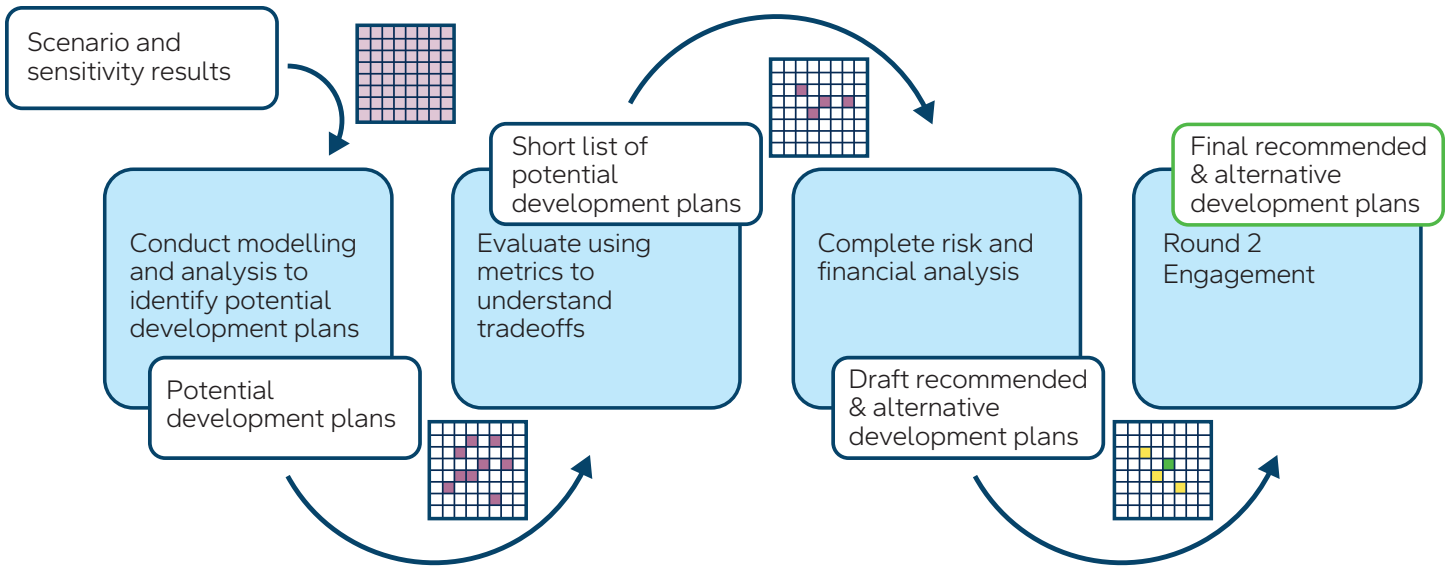


Figure 9 – Modelling, Analysis and Evaluation flow diagram, arriving at a recommended development plan

Feasible Resource Options in the Development Plan Timeframe

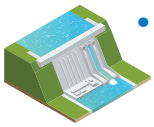
Modelling and analysis identified six resources are available to meet demand in the development plan's 10-year timeframe, with more options available after 2035. These six resources formed the building blocks of our potential development plans:

- Efficiency Plan Projection;
- Additional energy efficiency programs;
- Wind;
- Enhancements to existing hydropower;
- Short-term utility-scale batteries;
- Combustion turbines fuelled by natural gas/biomethane.

They are feasible for the development plan because they:

- Can be implemented within the 10-year development plan timeframe;
- Provide the necessary reliability to meet energy and capacity needs; and
- Are proven technologies with reliable fuel sources.

Other resources are available for development, but **only after the 10-year plan timeframe**. Many energy resources exist in the world—but the list of feasible resources is limited by the Manitoba context and other circumstances, like time to in-service. Resources that may be feasible under different circumstances, but for the reasons listed are not feasible in potential development plans under the 2025 IRP, include but are not limited to:



- **New hydropower** – Not feasible primarily due to long lead times for implementation (10+ years) and high up-front capital costs.

- **Nuclear small modular reactors (SMRs)** – Not feasible due to long lead times, primarily due to regulatory requirements (none are yet operational in Canada) and high costs.

- **Long-term battery storage** – Not feasible due to high current costs and short asset life. This is also an emerging technology with limited market availability.

- **Combustion turbines fuelled by alternative fuels and carbon capture and sequestration (CCS)** – Not feasible due to limited fuel supplies in Manitoba and challenging or uncertain logistics in fuel procurement. Further, 100 per cent hydrogen turbines are not yet available in the market for purchase, and CCS comes with a high cost and low value when combined to back-up resources.

There is interest how the IRP and ongoing energy planning is responding to rapid technology advancements. There is a desire to see these new and emerging resources options, including energy storage, small modular reactors and alternative fuels sources, such as hydrogen.

Identifying Potential Development Plans

The 2025 IRP used scenario and sensitivity modelling and analysis to generate 10 potential development plans. These 10 potential development plans were formulated to:

- Include **different combinations and sequencing** of the six feasible resource options;
- Align with the Government of Manitoba's **Affordable Energy Plan**;
- Comply with **net-zero grid by 2035** requirements;
- Support a **pathway to a net-zero economy by 2050**;
- Include a **minimum of 600 MW** of Indigenous majority-owned wind;
- **Reflect feedback** from public engagement; and
- Consider **all 2025 IRP load projections**.

The 10 potential development plans were organized within three groupings:

1. **Lower Cost Plans.** Scenario and sensitivity results showed that to balance cost and reliability, the model would consistently select combustion turbines fuelled by natural gas in portfolios of resources. This first group includes four plans that tested various quantities of combustion turbines fuelled by natural gas/biomethane. These plans are among the lowest cost development plans that meet evaluation criteria.

2. **Diversified Capacity Plans.** This group includes three development plans that leverage the strengths of the Lower Cost Plans and also incorporate the alternatives within the Maximized Alternatives Plans to diversify resource options. Altogether, they seek to provide a balance between cost, reliability, environment, and socio-economic impacts, factors important to Manitobans as heard during engagement.

3. **Maximized Alternatives Plans.** Through engagement with Manitobans, we heard clearly that it is important to explore alternatives to combustion turbines fuelled by natural gas/biomethane. This third group of potential development plans includes three plans that test alternate resource options to minimize the quantity of combustion turbines, like additional energy efficiency programming, battery storage, and enhancements to existing hydroelectric generation.

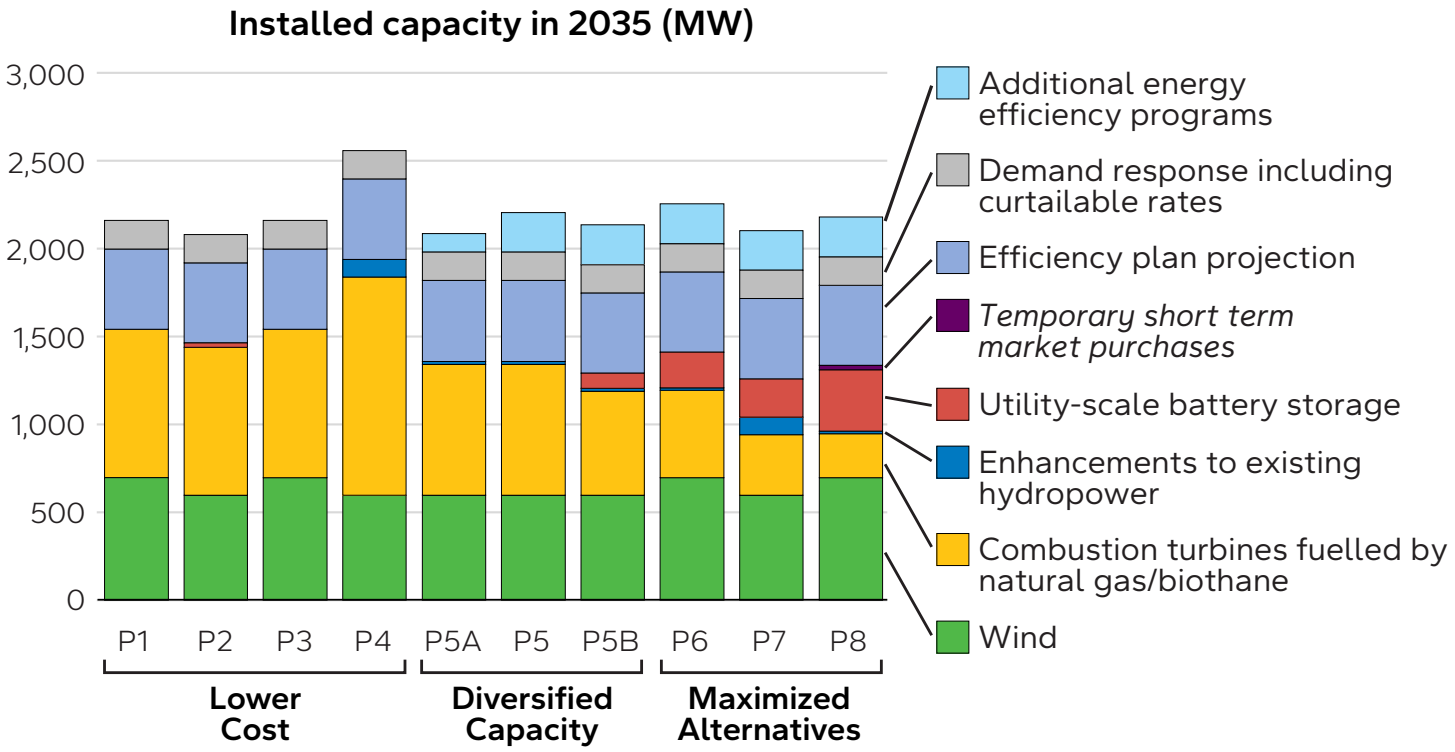


Figure 10 – Ten potential development plan resource stacks

As outlined in the **Engagement Report**, some interested parties expressed concerns about combustion turbines and asked if cost-driven decisions may outweigh other considerations such as environmental and social impact. Grouping the potential development plans emphasized that Manitoba Hydro was incorporating this feedback into the modelling observations.

Shortlisting the Potential Development Plans

To create a short list of development plans for financial and risk analysis, Manitoba Hydro assessed 10 potential plans using established evaluation metrics and a build-out target. These metrics—developed for the IRP and informed by engagement with customers, governments, interested parties, and others—help highlight the trade-offs between plans with different characteristics. The build-out target defines the minimum level of resources needed to meet future energy needs.

Plans were shortlisted if they:

- Performed well on evaluation metrics within their groupings;
- Met the build-out target through 2035; and
- Offered meaningfully different approaches to development.

Each plan was assessed against nine evaluation metrics grouped under four themes:

- cost,
- reliability,
- environmental, and
- socio-economic.

(See ***Appendix 8 - Evaluation*** for details).

These metrics were developed through workshops with both internal Manitoba Hydro teams and external parties. Internal sessions focused on ensuring the measures could effectively assess the plans, while external sessions ensured the metrics aligned with expectations and could clearly illustrate trade-offs.

Establishing a build-out target helped narrow the scope of load projections in the 2025 IRP. It defines a minimum quantity of resources needed to reliably meet future energy needs. This approach helps to balance not building enough (inadequate supply) versus building too much (not enough demand).

For the 2025 IRP, the build-out target in Figure 11 was based on the 2024 Electric Load Forecast (2024 ELF) from 2025 to 2029. This is because no utility scale resources can be built in this time, limiting options to support

load growth beyond the 2024 ELF. From 2030 to 2035, the build-out target is equal to the 2025 IRP 2-medium load projection to support a net-zero economy by 2050 and ensure that resources are in place to support this level of demand. The build-out target was further validated through the risk analysis, which confirmed that building to serve this level of demand would help manage most reliability-related risks affecting the supply-demand balance.

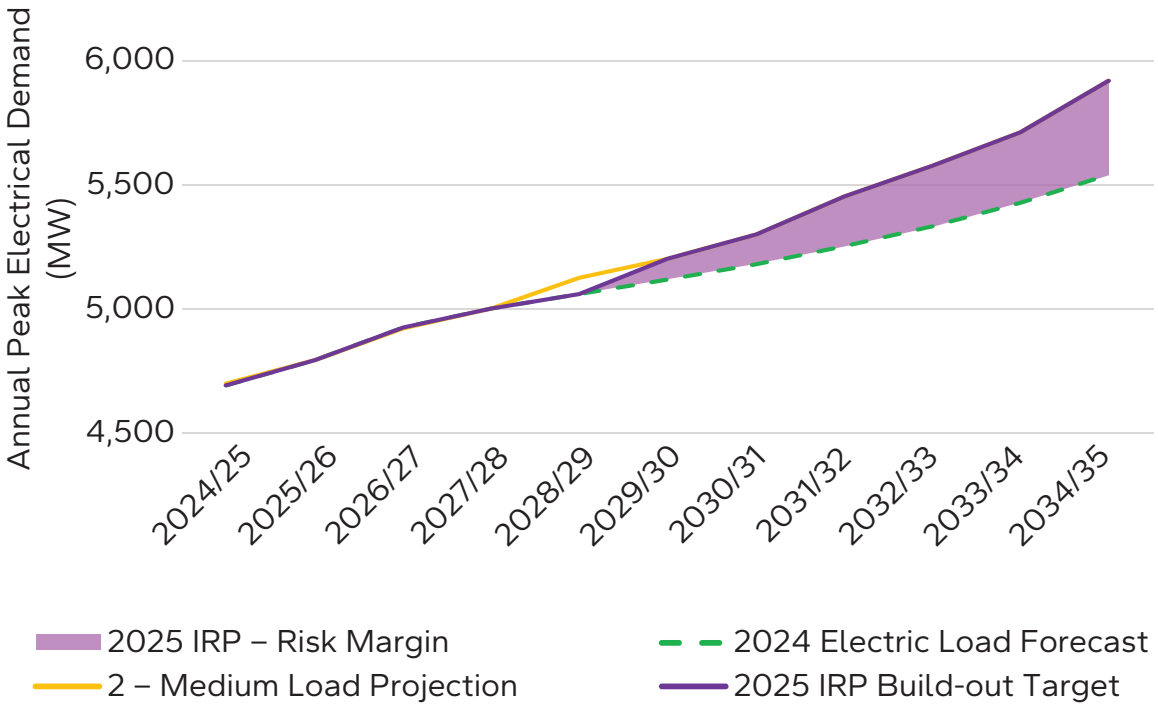


Figure 11 – 2025 IRP Build-out target

Through this shortlisting process, the initial 10 development plans—spanning three distinct groupings—were narrowed down to five. The results are shown in the Figures 12 and 13 below.

The plans not carried forward for further analysis include:

- **Plan P1**, which does not balance cost and reliability across all load projections and does not meet the build-out target;
- **Plan P2**, which does not meet the build-out target;
- **Plan P4**, which does not balance cost and reliability across all load projections;
- **Plan P6**, which does not meet the build-out target, has no themes evaluated as more favourable, and has less favourable costs; and
- **Plan P8**, which does not meet the build-out target, has the highest costs among potential development plans, and has less favourable reliability.

At least one plan from each grouping was shortlisted, with all three Diversified Capacity plans carried forward for further analysis. The plans carried forward for further analysis were:

Lower Cost Grouping

- **Plan P3** – Prioritizes cost and reliability by employing combustion turbines in near-term. More wind contributes some social-economic benefits.

Diversified Capacity Grouping

- **Plan P5** – Includes alternative dispatchable capacity resources and enhances reliability through additional combustion turbines. Maximizes energy efficiency, providing additional socio-economic benefits.
- **Plan P5A** – Maintains reliability of P5 by employing combustion turbines, while building closer to the build-out target through reduced reliance on additional energy efficiency programs.
- **Plan P5B** – Maintains the socio-economic benefits of P5 through maximizing additional energy efficiency programs, while building closer to the build-out target through smaller combustion turbine selections.

Maximized Alternatives Grouping

- **Plan P7** – Prioritizes alternative dispatchable capacity resources to minimize reliance on combustion turbines in the near-term. Maximizes energy efficiency, providing additional socio-economic benefits.

Lower Cost Plans

PDP	Reliability	Costs	Environmental	Socio-Economic	Build-out Target Status
P1	Less Favourable	More Favourable	Neutral	Neutral	Does Not Meet
P2	Less Favourable	More Favourable	Neutral	Neutral	Does Not Meet
P3	Neutral	More Favourable	Neutral	Neutral	Meets
P4	Neutral	Neutral	Neutral	Neutral	Meets

Diversified Capacity Plans

PDP	Reliability	Costs	Environmental	Socio-Economic	Build-out Target Status
P5A	Neutral	Neutral	Neutral	More Favourable	Meets
P5	Neutral	Neutral	Neutral	More Favourable	Meets
P5B	Neutral	Neutral	Neutral	More Favourable	Meets

Maximized Alternative Plans

PDP	Reliability	Costs	Environmental	Socio-Economic	Build-out Target Status
P6	Neutral	Less Favourable	Neutral	Neutral	Does Not Meet
P7	Neutral	Neutral	Neutral	More Favourable	Meets
P8	Less Favourable	Less Favourable	Neutral	Neutral	Does Not Meet

Figure 12 – Evaluation of the ten potential development plans to create the shortlist of five plans for further analysis.

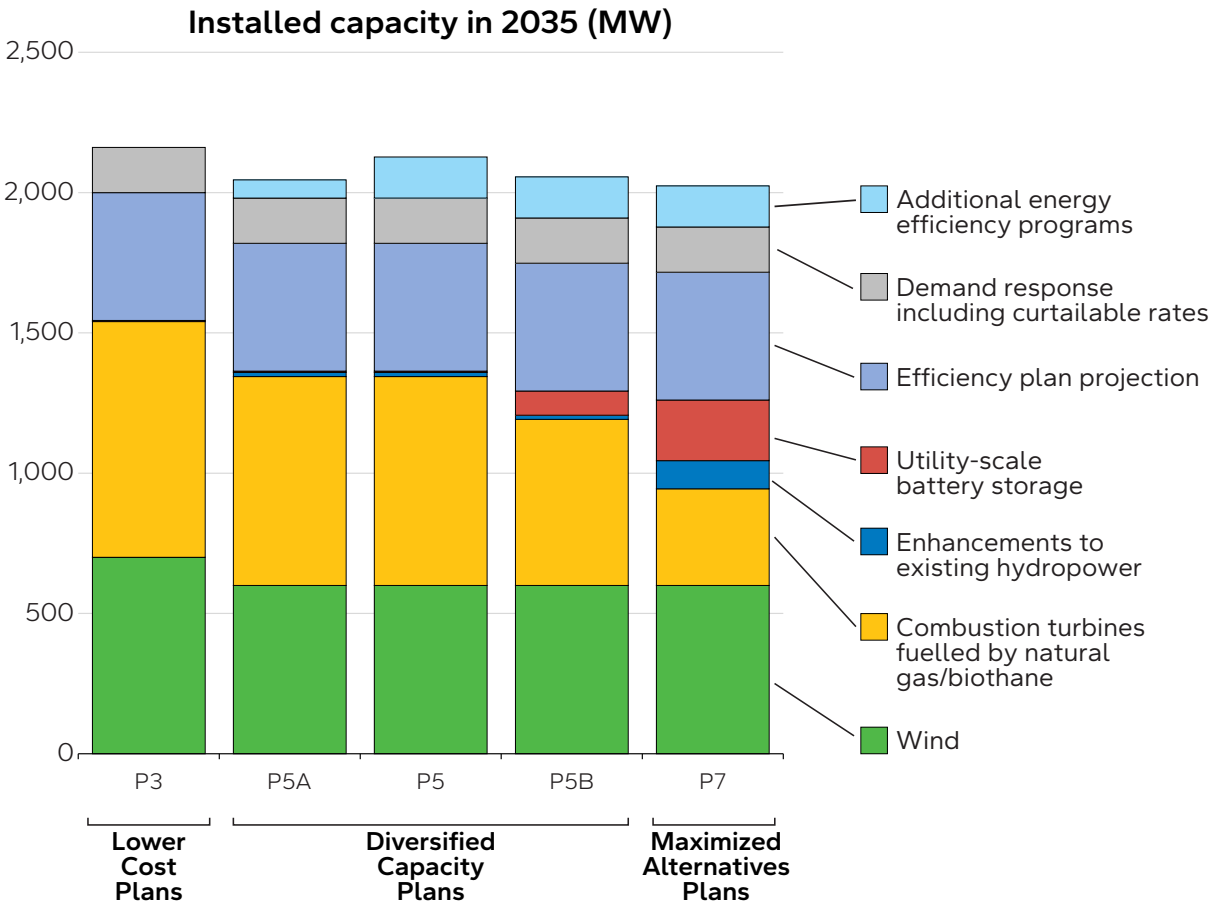


Figure 13 – Resource stacks of five shortlisted potential development plans

Arriving at a Recommendation

The process of moving from the short list of five potential development plans to a recommended plan began with financial and risk analyses. A recommendation framework was applied to assess the results, using criteria that reflect acceptable levels of financial impact and enterprise risk. Thresholds within the framework helped highlight plans most likely to align with Manitoba Hydro's strategic, financial, and policy objectives.

The financial analysis completed for the 2025 IRP resulted in high-level estimates of the capital investment needed to implement the five shortlisted development plans. These estimates, intended for the purpose of comparing the financial impact of the shortlisted plans, ranged from $3.1 billion to $4 billion, as shown in Table 3 below. These investments are above investments needed to sustain the existing system.

Potential Development Plans	Capital Investments to 2035 ($ billions, nominal)
Lower Cost, P3	$3.1
Diversified Capacity, P5A	$3.4
Diversified Capacity, P5	$3.9
Diversified Capacity, P5B	$3.9
Maximized Alternatives, P7	$4.0

Table 3: Summary of financial analysis results

An energy wallet analysis was also initiated as part of the 2025 IRP to explore this emerging approach to estimating customers' total household energy costs – including utility bills, transportation fuel, and appliance purchases – to better understand how potential development plans may impact household costs. Because the methodology is still evolving, this work was intended as supplemental and not considered in the recommendation framework or included in the 2025 IRP report. Manitoba Hydro is continuing to work with our consultant to refine the energy wallet analysis and validate outcomes.

Risk analysis, conducted through Manitoba Hydro's Enterprise Risk Framework, focused on material differences between plans. It considered implementation risks and risks tied to specific resources, as well as broader system risks such as potential failure of the high-voltage direct current transmission system or lower-than-expected demand reductions from energy efficiency programs.

As shown in Figure 14 below, plans P3, P5, and P5A were relatively less exposed to major risks. P7 was the most vulnerable, due to its reliance on aggressive energy efficiency targets and fewer capacity additions, which increased supply risk.

While the risks for Execution and Transmission & Distribution Execution and Capital Expenditures (Capex) were considered very high, there were no material differences to these risk categories between any of the shortlisted potential development plans. These risks remain with any of the potential development plans and arise from a combination of factors including but not limited to the likely complexity of each specific project, including the ever-present potential for supply chain and regulatory approval delays. These risks would be mitigated or managed through targeted controls developed at the outset of each project.

Potential Development Plan (PDP)

Risk	P3	P5A	P5	P5B	P7
Execution	20	20	20	20	20
HVDC Failure	16	16	16	20	20
Economic	16	16	16	16	20
Demand	12	12	12	12	15
Regulation	12	12	12	16	16
Resource Effective Capacity	3	3	3	3	3
Long-term Gen. and Distribution Reliability	9	9	9	9	9
Sovereignty	1	1	1	2	2
Performance of Energy Efficiency	8	8	8	8	8
Extreme Weather	4	4	4	3	3
Reputation	12	12	12	12	9
T&D Execution and Capex	20	20	20	20	20

Figure 14 – Summary of risk analysis results

While no plan can eliminate all risks, the analysis confirmed that planning to the build-out target would help manage most reliability-related risks affecting the supply-demand balance.

The financial and risk analysis results were summarized within a recommendation framework, which included the following thresholds:

- **Risk:** Maximum of one very high risk level for any of the key risks identified;
- **Capital Investment by 2025:** Within $600 million of the lowest-cost option.

Using this framework, the five short-listed plans were compared. P3 and P5A emerged as the best-performing options, meeting all investment and risk thresholds. Plans P5, P5B, and P7 did not sufficiently meet the criteria and were not considered further

Potential Development Plan	Investment	Risk	Summary
P3	✓	✓	✓
P5A	✓	✓	✓
P5	✗	✓	✗
P5B	✗	✗	✗
P7	✗	✗	✗

Figure 15 – Recommendation framework results

The framework comparison highlighted two potential development plans—P3 and P5A—as the best-performing plans, passing all investment and risk thresholds. To recommend a development plan, we assessed the remaining two potential development plans for best alignment with the Affordable Energy Plan (AEP) and other government mandates for Manitoba Hydro. While P3 is the lowest-cost plan, P5A includes additional energy efficiency measures above the Efficiency Plan Projection, addressing the AEP's goal to expand energy efficiency. P5A also includes enhancements to existing hydropower that address the AEP's goal of infrastructure refurbishments. P5A was, therefore, the basis of the recommended development plan, as it more strongly aligns with the AEP. P3 is a viable alternative plan, but was not recommended because alignment with the AEP is not as strong as the alignment between P5A and the AEP.

Directives/ objectives	P3	P5A
Maintain affordability	✓ Lowest projected rate increases in the near-term.	✓ Higher initial projected rate increases, but comparable long-term to P3.
Expand energy efficiency	✗ Only includes efficiency plan projection.	✓ Includes additional energy efficiency above the efficiency plan projection.
Support Indigenous ownership	✓ Includes up to 700 MW of wind.	✓ Includes 600 MW of wind.
Hydro station refurbishments	✗ No enhancements to existing hydropower.	✓ Includes enhancements to existing hydropower.
Net-zero grid by 2035	✓ Meets net-zero grid by 2035.	✓ Meets net-zero grid by 2035.
Path to net-zero economy by 2050	✓ Enables a path to net-zero economy by 2050.	✓ Enables a path to net-zero economy by 2050.

Figure 16 – Alignment with Affordable Energy Plan and government mandates for Manitoba Hydro

6.2. Learnings

IRP learnings are fundamental to the road map and inform the near-term actions and signposts. They are rooted in studied and documented outcomes. They summarize key insights gained through the process of developing the IRP, taken from engagement and customer input and feedback, from modelling and analysis, and from studying potential and implemented government policies.

There are five learnings within the 2025 IRP road map.

1. Virtually all utilities in North America are subject to increased demand for capacity and the need for grid sustainment and modernization to meet energy needs. With inherent long lead times for construction of new resources, utilities must pursue uninterrupted development to get and stay ahead of the energy transition. Course changes spurred by policy would risk our short-term ability to meet energy needs.

2. All plans have risks and trade-offs. Modern integrated resource plans, like Manitoba Hydro's, include analysis that goes beyond the utility's perspective to understand and assess these trade-offs.

3. Given the 2030 need date, there are limited options to serve demand.

4. The recommended development plan preserves reliability and enables an affordable pathway to net-zero in Manitoba by including the strategic use of natural gas by industry and by customers for home heating, while enabling impactful forms of GHG reductions and efficiency gains in non-utility sectors like transportation.

5. An ongoing collaborative approach that includes all Manitobans is needed to plan and achieve net-zero. Manitoba Hydro's role as an energy utility is one of many coordinated efforts.

6.2.1. Details of the 2025 IRP Learnings

Learning One

Virtually all utilities in North America are subject to increased demand for capacity and the need for grid sustainment and modernization to meet energy needs. With long lead times for construction of new resources, utilities must pursue uninterrupted development to get and stay ahead of the energy transition. Course changes spurred by policy or other factors pose a risk to utilities' short-term abilities to meet energy needs.

Key points:

a) The need for action for new resources is now, due to load projections and customer connection requests.

b) Meeting an accelerated pace of decarbonization would be a challenge in the early years.

There is interest in economic development, and how the IRP would account for economic growth that has significant potential to influence load projections.

c) Enhancements to existing hydropower assets could be a cost-effective solution.

d) Energy planning needs to consider a broad range of scenarios, including planning for potential pathways to a net-zero economy by 2050.

e) The Affordable Energy Plan has detailed direction for Manitoba Hydro to build the reliable, secure and affordable energy Manitoba Hydro needs for the future.

Engaged Manitobans wanted a better understanding of Manitoba Hydro's role in the net-zero economy and the relationship between the IRP and other provincial policies. More alignment between all energy planning decision-makers including government, crown corporations and regulators would help advance net-zero economy goals.

Manitoba Hydro needs to remain ahead of the energy transition to ensure continued safe, reliable, and affordable energy. Course changes, such as abrupt policy changes, risk our short-term ability to meet energy needs. Staying ahead helps Manitoba Hydro maintain safe, reliable, and affordable energy. If we are behind, we risk not being ready to meet energy needs in the near term.

Analyzing a broad range of future scenarios helped Manitoba Hydro to better understand a number of factors, including the potentially wide range of energy supply and delivery costs, technological readiness, greenhouse gas (GHG) emissions, supply system capabilities, resource mixes, and the dates when new resources will be needed ("need dates"). Energy planning must include continued monitoring and evaluation of a broad range of scenarios to prepare for the uncertainty of the future, including planning to support potential pathways to a net-zero economy. Planning must also continue to evaluate opportunities to leverage technologies and supply system upgrades, which can assist with serving future energy demand, along with monitoring resource lead times in order to assess when commitments need to be made.

Many customers are saying they expect their energy utilities to take the lead by investing rapidly in new infrastructure and encouraging new energy choices.

All Manitobans, governments, Crown corporations, regulators, interested parties, and Indigenous peoples and communities have important roles to play in the next steps. Since the 2023 IRP, the Province of Manitoba published their energy policy—The Affordable Energy Plan. Key points from the plan include the need for utilities to be aligned, partnerships to be formed, and for Manitobans to work collaboratively to manage the pace of change.

Learning Two

All plans have risks and trade-offs. Contemporary integrated resource plans, like Manitoba Hydro's, include analysis that goes beyond the utility's perspective to understand and assess these trade-offs.

Key points:

a) Manitoba Hydro must weigh options that compete with each other and consider impacts beyond the utility (e.g., socio-economic impacts versus cost).

b) Until utility-scale resources are in service, customer side solutions will play a significant role in the development plan. These solutions come with short-term benefits, but also come with higher costs and their own set of risks.

Arriving at the recommended development plan was a very complex but necessary process, so that trade-offs and their potential impacts could be understood.

Perspectives from large and residential customers, the provincial government, municipal representatives, First Nations and Metis peoples, as well as a broad range of interested parties from academia to nonprofit organizations were sought and incorporated into development of the IRP. This means the lowest cost option cannot always prevail.

The provision of reliable and affordable energy should be a key consideration in the selection of resources, but should not outweigh the consideration of environmental and social impacts.

Investment is required to meet current firm demand, and significant investment will be needed in all scenarios to support the energy transition. Trade-offs necessarily exist between what can and cannot be achieved, particularly related to the Government of Manitoba's direction that Manitoba Hydro study the impacts of maximizing affordability, building a pathway to a net-zero economy, and implementing alternatives to the use of natural gas generation.

These factors are often at odds: for example, if all natural gas home heating is eliminated as a step to achieve net-zero, affordability for customers may be reduced. This would also lead to greater electricity load requirements, so rates would most likely need to increase to pay for

additional infrastructure to supply electricity, and there would be associated direct customer costs to pay for a new electric furnace if replacements are mandated ahead of an existing natural gas furnace's service life. To develop a comprehensive development plan, we need to take strategic steps to narrow our focus as we look at considerations such as these.

Manitoba Hydro customers are showing some interest in self-generation and are less interested in switching from natural gas to electric space heating.

Future load growth is uncertain, complicating the trade-offs even more. Load and resource constraints (maturity, supply chain, schedule and costs) impact which resources can be selected, which drives investment; investment decisions then have their own significant impacts on trade-offs. Determining which and when new resources are needed helps to determine when (and which) resources are not deemed feasible, also complicating trade-offs. As energy efficiency continues to grow, continued investment in maintaining the existing system will also play an important role for meeting all future scenarios' firm demand, introducing trade-offs with not only cost but reliability. These decisions will continue to grow more complex as the energy transition continues.

Learning Three

Given the 2030 need date, there are limited options to serve demand.

Key points:

a) Meeting Manitoba's winter peak demand is the major driver of future resource selections.

b) Through analysis, only six resource options emerged as potential to meet demand in the next 10 years.

c) Energy efficiency measures that reduce peak electricity demand are the most valuable form of efficiency measures to the electricity system.

Over the past 18 months, we analyzed more than 50 scenarios and sensitivities, and from the analysis, only six resource options emerged as feasible ways to meet demand over the next 10 years: Efficiency Plan Projection, additional energy efficiency programs, wind generation, utility

scale battery storage (short-term), enhancements to existing hydropower and natural gas/biomethane fuelled combustion turbines. Remaining resource options were not considered feasible due to factors like long planning and installation lead times, lack of suitability in Manitoba's climate, and high costs. From the resource options selected, demand response and additional energy efficiency programs that reduce peak demand were found to provide valuable opportunities to address demand in the development plan timeframe.

Analysis also identified that new capacity resources will be required, with results indicating combustion turbines can meet the need for a dispatchable capacity resource and are a complement to future variable energy resources like wind, which aligns with Manitoba's Affordable Energy Plan direction. In 20 years, a large portion of our energy will still come from the electricity and natural gas assets that are in service today, so Manitoba Hydro must continue to invest in increasing capacity, and improving and maintaining them as well as continuing to support the use of natural gas in order to reduce current and potential future strain on the electrical system.

Residential customers identified several energy choices they are considering, including showing an interest in tracking and managing their energy use through smart home devices.

Learning Four

The recommended development plan preserves reliability and enables an affordable pathway to net-zero in Manitoba by including the strategic use of natural gas by industry and by customers for home heating, while enabling impactful forms of Manitoba GHG reductions and efficiency gains in non-utility sectors like transportation.

Key points:

a) Integrated use of electricity and natural gas systems enables strategies that support Manitoba's GHG emissions reductions more affordably.

b) Leveraging existing natural gas assets (both our natural gas electricity generation and our natural gas distribution system assets) is a more affordable way to support the decarbonization of space heating and the future use of biofuels.

c) Negative emissions technology can have a lower impact on peak electric demand than the electrification of space heating, while achieving the same quantities of GHG emissions reductions.

Strategic use of natural gas assets and other fuels enables a more affordable solution to a future net-zero economy (compared to more restricted use of these assets and fuels). For example, strategies using dispatchable capacity resources such as combustion turbines fuelled by natural gas, which can complement variable resources like wind, can be a more affordable way to support provincial electrification of transportation and provide dependable energy during a drought. In comparison, a future with more stringent restrictions on fossil fuel-fired electricity generation in Manitoba could increase our costs without providing any meaningful provincial GHG emission benefits.

Industrial uses, municipal facilities, and space heating and cooling continue to be the largest sources and users of natural gas and electricity in most municipalities. Many municipalities want natural gas to be maintained or expanded in their communities to ensure affordable space heating for residents and economic development.

The transition to electric fleet vehicles is anticipated to contribute to future energy use as part of decarbonization initiatives. Widespread adoption of electric vehicles for municipal and industrial operations may take time due to market availability and feasibility.

Early in the IRP development process engagement indicated that it was not an unreasonable assumption to expect to use natural gas as a back-up fuel, even as technologies fuelled by alternative fuels mature. And during the mid-project information session, it was validated that limited use of combustion turbines fuelled by natural gas was a cost-effective way meet growing peak as other resources are built, and other technologies mature was acceptable.

The need to meet Manitoba's winter peak demand is the major driver of future resource selections. The electrification of space heating would continue to have a significant impact on peak electric demand, so strategies such as using dual fuel space heating systems could be a more affordable way to help us meet peak demand.

Learning Five

An ongoing collaborative approach that includes all Manitobans is needed to plan and achieve net-zero. Manitoba Hydro's role as an energy utility is one of many coordinated efforts.

Key points:

a) There's an opportunity for the energy planning community (including Manitoba Hydro, governments, regulators and interested parties such as customers and Indigenous peoples and communities) to work together in the best interests of Manitobans.

b) Ongoing discussions with the broader energy planning community are necessary to navigate the energy transition.

c) We must continue to evolve our interests and have conversations which support collaboration and alignment to effectively navigate a complex energy future.

Manitoba Hydro has heard from the Technical Advisory Committee, Interested Parties, Indigenous Nations, Municipalities and customers large and small that they want to work together toward the future. Participants found value in deepening their understanding the energy planning process and having the opportunity for discussions with Manitoba Hydro and other interested parties.

Technical Advisory Committee members expressed appreciation for the opportunity to ask challenging questions and for Manitoba Hydro's willingness to engage and provide answers. They expressed that this is a good start, and that ongoing collaboration and engagement will help build trust in the energy planning process. Future engagement could consider opportunities for further input into the planning and modelling assumptions at the outset of the IRP development process.

Decisions to reach a net-zero economy are not Manitoba Hydro's to make alone and these decisions could have a meaningful impact on the future energy needs. These decisions need to be made in coordination with others. There is value in the foundation built through the IRP process to bring key decision-makers, partners, communities, Indigenous leadership, and others around a common table to

advance energy planning across various contexts in Manitoba. There is strong interest to continue planning our energy future together, including planning for Manitoba's pathway to a net-zero economy. Enhancing energy literacy and understanding diverse viewpoints, including about how to balance considerations like environment, climate, and socio-economic factors, are vital in future energy planning and resource decision-making. There are opportunities to consider innovative solutions and support communities and customers in achieving their energy-related goals and plans.

Participants consistently identified the desire for Manitoba Hydro to be a leader in the energy transition. There is also a strong interest in participating in the energy transition, and engaged participants are looking for information on risks and opportunities. There was great expression of appreciation for engagement with the utility and a desire to continue.

6.3. Near-term actions

Near-term actions (NTA) are the next steps to plan and implement the recommended development plan and prepare for the next IRP. They may present opportunities for collaboration with external parties and, while discussed in brief here, the near-term actions will be planned in greater detail in future.

The 2025 IRP road map includes 12 near-term actions (grouped into two themes) to be completed over the next five years. The two themes are:

- actions focused on implementing the recommended development plan; and
- actions focused on energy planning to prepare for a range of potential futures.

In addition to these specific near-term actions coming out of the IRP, Manitoba Hydro will continue to support the energy transition in Manitoba through our ongoing engagement and relationships with our customers, communities, and organizations across the province.

Near Term Action – Theme #1: Implement the development plan

1. Collaborate with Efficiency Manitoba to support the development and delivery of their next Plan, including legislated and additional targets per this IRP.
2. Implement demand response and curtailable rate programs, in collaboration with Efficiency Manitoba. Advance enabling technologies such as advanced metering infrastructure.
3. Procure Indigenous majority-owned wind through a call for power.
4. Execute plans for combustion turbines fuelled by natural gas/ biomethane.
5. Implement enhancements to existing hydropower and continue to pursue additional opportunities.
6. Implement utility-scale battery pilot project.
7. Pursue near-term import/export market options as available.

Near Term Action – Theme #2: Prepare for the next IRP and continue on going planning

8. Monitor the development plan implementation and load growth (e.g., tracking energy efficiency, resource project schedules, and supply-demand balance) and make resource adjustment as needed.
9. Explore alternative fuels, credits, and Manitoba-based offsets to combustion turbine GHG emissions and further investigate the direct use (blending or full replacement) of alternative fuels, such as hydrogen.
10. Continue to improve and optimize our integrated resource planning processes.
11. Pursue additional items in the Affordable Energy Plan, such as the clean heat strategy, electric vehicle charging, and ground source heat pumps and district heating.
12. Advance planning for resources with potential to be recommended in the next IRP, including small modular reactors, new hydropower, and energy storage solutions.

It is important to note that implementation of the individual near-term actions requires more detailed planning to enable completion in the next five years. Each action will need to be planned and prioritized, with full definition of its scope of work and schedule, which is outside the scope of this IRP.

Near-term actions are driven by the learnings of the IRP.

Where there is less certainty or understanding of the impact an action may have, the actions focus on more **study and research**.

Where there is more certainty and/or understanding of the impact, but less certainty about feasibility in Manitoba, actions focus on **trials and demonstrations**.

Where there is confidence in the need for a program or initiative, actions take steps toward **implementation**.

6.3.1. **Theme 1:** Implement the development plan

The first near-term action theme—to implement the development plan to meet capacity and energy needs—is based on the insight that new resources are needed to meet Manitoba's energy needs. This is common to virtually all utilities in North America. Long lead times for implementation of new resources also mean that Manitoba Hydro needs to act quickly to get and stay ahead of the energy transition.

1 **2025 IRP NTA One:** Collaborate with Efficiency Manitoba to support the development and delivery of their next Plan, including legislated and additional targets per this IRP.

Over and above regular and ongoing collaboration between Manitoba Hydro and Efficiency Manitoba, this NTA involves establishing dedicated cross-functional teams, conducting joint planning sessions, and sharing data with Efficiency Manitoba to support development and delivery of their next Efficiency Plan. IRP analysis demonstrated that expediting and expanding energy efficiency provides significant value in both reducing demand and the speed at which these programs can be implemented compared to other capacity resources. Reducing peak demand through energy efficiency can defer the need to add supply resources. It also contributes positively to developing Manitoba's economy through job creation and provides other socio-economic benefits. The additional energy

efficiency programs identified in the recommended development plan will be integrated into Efficiency Manitoba's planning to optimize system benefits and maximize customer value.

2 **2025 IRP NTA Two:** Implement demand response and curtailable rate programs, in collaboration with Efficiency Manitoba. Advance enabling technologies such as advanced metering infrastructure.

Through IRP modelling, demand response was shown to bring value by delaying the need for new capacity resources. As a result, we will work closely with Efficiency Manitoba to design and implement demand response programs that help shift customer load away from peak periods. These programs are being developed to manage peak demand. Achieving the full value of demand response requires enabling technologies, such as advanced metering infrastructure (AMI). As a result, this NTA also includes planning and implementation of AMI, which will enable real-time energy management, support demand response, and improve the customer experience. AMI deployment will be coordinated with other customer-side initiatives to maximize its benefits.

3 **2025 IRP NTA Three:** Procure Indigenous majority-owned wind through a call for power.

Manitoba Hydro has started a competitive procurement process for up to 600 MW of energy from Indigenous majority-owned wind projects in Manitoba. The projects will be procured through power purchase agreements in alignment with the Manitoba Affordable Energy Plan. With the goal to announce successful bids by spring 2026, this initiative supports both Manitoba's energy needs and economic reconciliation.

4 **2025 IRP NTA Four:** Execute plans for combustion turbines fuelled by natural gas/biomethane.

As a low-cost resource that provides dispatchable capacity, combustion turbines fuelled by natural gas/biomethane were consistently selected in IRP modelling and analysis. To ensure system reliability during peak demand periods or drought and to accommodate intermittent resources, Manitoba Hydro will take preparatory steps to implement natural gas/biomethane combustion turbines as a dispatchable capacity resource. This includes issuing request for proposals to reserve manufacturing slots. Manitoba Hydro will include options to integrate alternative fuels such as biomethane or hydrogen, as those fuels become available.

5 **2025 IRP NTA Five:** Implement enhancements to existing hydropower and continue to pursue additional opportunities.

This NTA represents beneficial investments Manitoba Hydro can make to improve system performance and defer the need for new infrastructure. These enhancements may include turbine upgrades, control system improvements, and/or targeted transmission projects. Enhancements have already been identified and implementation has begun at Manitoba Hydro's Pointe du Bois generating station, and Manitoba Hydro will continue to pursue cost-effective upgrades and make operational improvements to other existing generation, transmission, and distribution assets to increase system capacity and efficiency.

6 **2025 IRP NTA Six:** Implement utility-scale battery pilot project.

The IRP identified short-term utility-scale battery storage as a source of dispatchable capacity. A limited pilot of five MW will help test battery effectiveness in Manitoba and help Manitoba Hydro understand the potential benefits of larger installations in the future. The pilot will be advanced through a structured, staged generation planning process to ensure effective planning that informs future decisions on broader battery storage integration in Manitoba's system.

7 **2025 IRP NTA Seven:** Pursue near-term import/export market options as available.

To manage supply and demand variability, Manitoba Hydro will continue to explore and secure short- to medium-term market purchases and sales. This includes optimizing the use of interconnections and participating in regional market opportunities to ensure cost-effective and reliable energy supply.

6.3.2. **Theme 2:** Prepare for the next IRP and continue ongoing planning

The second theme includes a summary of the work Manitoba Hydro will need to do to advance planning and prepare for the next IRP. This theme focuses on technical studies, system integration, and resource planning to support the ongoing energy transition in Manitoba.

8 **2025 IRP NTA Eight:** Monitor the development plan implementation and load growth (e.g., tracking energy efficiency, resource project schedules, and supply-demand balance) and make resource adjustment as needed.

This NTA builds on the work that Manitoba Hydro already does. It involves monitoring both the implementation of the development plan, the performance of the existing system and the evolution of supply needs. This includes tracking energy efficiency performance, resource project schedules, and supply-demand balance. This monitoring helps Manitoba Hydro understand if we need to make different decisions to ensure reliability and alignment with long-term system needs.

9 **2025 IRP NTA Nine:** Explore alternative fuels, credits, and Manitoba-based offsets to combustion turbine GHG emissions and further investigate the direct use (blending or full replacement) of alternative fuels, such as hydrogen.

Reaching a net-zero future in Manitoba will require the use of alternative fuels, credits and offsets. This NTA involves conducting technical studies, cost analyses and leveraging technical experts to investigate effective use of low-carbon fuels for use in dispatchable generation and direct applications, including blending or full replacement in space heating. It also includes evaluating roles of biomethane credits or similar mechanisms that could be applied to both utility operations and industrial natural gas users. This NTA will support reducing emissions from continued use of natural gas.

10 **2025 IRP NTA 10:** Continue to improve and optimize our integrated resource planning processes.

Maturing Manitoba Hydro's integrated planning is essential. Future decisions to be made in support of the energy transition will only become more complicated, and better understanding how to co-optimize natural gas and electric assets across Manitoba Hydro's system will help the utility meet corporate goals and objectives for performance while ensuring Manitoba Hydro continues to provide safe, reliable, and affordable energy to Manitobans.

Manitoba Hydro will better integrate transmission, distribution, and natural gas system planning into the IRP process by continuing to align on planning assumptions, inputs and constraints, and analysis criteria. Notably gaps remain in how these systems are coordinated, particularly in the consistency and effectiveness of planning methodologies and data quality. Reviewing

and updating these methodologies will be critical to improving integration. Particular attention will be given to understanding the implications of rapid load growth, which may require significant infrastructure investments like new stations and major asset replacements. This will help ensure that planning efforts reflect the full range of potential system needs and investment requirements.

11 **2025 IRP NTA 11:** Pursue additional items in the Affordable Energy Plan, such as the clean heat strategy, electric vehicle charging, and ground source heat pumps and district heating.

Not all solutions may be utility scale and therefore may not be highlighted in the development plan. Manitoba Hydro will continue to study additional items in Manitoba's Affordable Energy Plan. Space heating options are particularly important to understand because of Manitoba's climate—trade-offs between affordability, environmental impact, and reliability vary based on strategy. Different strategies may work better in different areas of the province. The 2025 IRP began to identify potential for more complex solutions, but more work remains to understand the fuller implications of these solutions. For example, the 2025 IRP determined that district installations of ground source heat pumps are not economic in the near term, but may become more competitive in the long term when compared to higher cost resources with longer lead times. Manitoba Hydro will continue to assess the role of ground source heat pumps, alternative space heating options, and other items in the Affordable Energy Plan, such as electric vehicle charging.

12 **2025 IRP NTA 12:** Advance planning for resources with potential to be recommended in the next IRP, including small modular reactors, new hydropower, and energy storage solutions.

Modelling and analysis in the 2025 IRP identifies resource decisions we may need to make in future IRPs. Preliminary planning needs to be done to ensure the next IRP includes up-to-date information on resource options the next IRP may include. Manitoba Hydro needs to advance planning for these high-potential resources—like small modular reactors, new hydropower, and utility-scale energy storage—as these resources are at the very early stages of their planning (and typically require long lead times for implementation to allow for appropriate regulation, licensing and construction). Studies for these resources will assess feasibility, costs, and regulatory considerations to inform future resource decisions.

6.3.3. **Beyond the NTAs:** Manitoba Hydro will continue to support the energy transition in Manitoba

Manitoba Hydro will continue to support the energy transition through our near-term actions, our ongoing engagement, and ongoing planning.

The energy transition is not something that Manitoba Hydro can address alone – there is a complex relationship of sharing information and aligning between multiple groups and organizations within Manitoba. To support the energy transition, Manitoba Hydro will:

Continue to build alignment with the Province of Manitoba, Efficiency Manitoba, the Public Utilities Board, customers and interested parties.

Strengthening alignment and building a shared vision for the energy transition represents our learning that there is an opportunity to continue working together with the energy planning community. The foundation of this alignment and vision has been established through the development of the IRP, but we need to continue to work together and build on this foundation.

Continue to provide timely, evidence-based advice that supports policy makers to achieve a managed transition for the benefit of all Manitobans, including supporting a vision for Manitoba Hydro's role in a net-zero future.

The energy transition is underway in Manitoba, but the pace of change is still uncertain and may be accelerated by policy. Manitoba Hydro will work with all levels of government to provide timely, evidence-based advice that supports policy development at a sustainable pace, helps manage energy demand growth and maximizes decarbonization outcomes. There is also opportunity to align planning efforts in pursuit of a net-zero future and better define Manitoba Hydro's role in achieving decarbonization goals.

Continue to connect with interested parties to share outcomes and learnings from the 2025 IRP and engage in ongoing energy planning and the execution of near-term actions.

Manitoba Hydro will continue to engage with interested parties to foster openness, transparency, and meaningful dialogue around the energy future. This approach prioritizes listening to and learning from diverse perspectives, including those of our Technical Advisory Committee and

other experts in the energy planning community. By creating opportunities for continued engagement between IRPs, we aim for continuous improvement and strive to deepen our understanding of the social, environmental, and economic impacts that shape our planning.

Support Economic Reconciliation through engagement with Indigenous Nations in Energy Planning.

Indigenous nations are actively pursuing economic development opportunities in the energy transition. Manitoba Hydro will contribute to reconciliation by supporting collaboration with Indigenous nations in energy planning. Through meaningful, ongoing Indigenous participation, we will aim to ensure their perspectives help guide Manitoba's evolving energy future.

Provide resources and information to allow customers to make informed energy choices that support a managed energy transition.

Manitoba Hydro will ensure customers have access to tools and information they need to make informed energy choices. This includes offering resources to help customers understand their energy use and providing Manitoba-based information about space heating costs for those considering upgrading space heating systems or building new homes.

6.4. Signposts

Signposts are leading indicators that help identify trends in the energy transition, in turn helping Manitoba Hydro anticipate when and how our customers' energy needs are changing.

Specifically, signposts are designed to:

- **Indicate the type, timing, pace, and magnitude of change** in energy demand and supply.
- **Inform the implementation of near-term actions and the recommended development plan**, ensuring appropriate pacing and responsiveness to evolving conditions.
- **Enable ongoing monitoring and reporting**, supporting planning and helping determine when changes to underlying IRP assumptions are substantial enough to warrant undertaking a new IRP.
- **Align with risk monitoring efforts**, particularly those associated with implementing the development plan.

To support the 2025 IRP, Manitoba Hydro has identified three types of signposts that signal significant shifts in the energy landscape. These three signposts have been identified as having the greatest potential impact on Manitoba's energy future and potential to cause Manitoba Hydro to alter plans:

Government Actions

Energy-related policies at the municipal, provincial, national, and international level can significantly influence the pace and scale of change. Monitoring these policies ensures Manitoba Hydro remains proactive and responsive to legislative and regulation changes that shape the energy industry.

Customer Decisions

The choices made by existing and future residential, commercial, industrial, and institutional customers affect demand for electricity and natural gas. Adopting new technologies (e.g. self-generation), changing consumption patterns, or shifting fuel sources are examples of these choices. Tracking these decisions helps Manitoba Hydro anticipate and meet future energy needs and strengthens ongoing relationships with our customers, helping us understand their energy goals and plans and the factors that influence these plans.

Technologies and Markets

Advances in energy technologies and shifts in energy markets influence how energy is produced, delivered, stored, and priced. Staying informed about these developments supports strategic planning and investment decisions.

These signposts will be continuously monitored and integrated into Manitoba Hydro's planning processes to ensure integrated planning remains relevant and responsive to emerging trends and uncertainties.

7. Next steps

While the 2025 IRP is complete, it is only one of the steps needed to ensure the long-term energy needs of Manitoba are met. The 2025 IRP will be submitted to the Government of Manitoba, who may choose to refer it to the Manitoba Public Utilities Board (PUB) for review and recommendation prior to their approval.

The immediate next steps for Manitoba Hydro will be to implement the 2025 IRP road map, including near-term actions related to the recommended development plan and near-term actions related to ongoing planning for the next IRP.

The near-term actions related to implementing the recommended development plan require more detailed and specific project planning for each of the included investments, right up to and including bringing these investments onto the grid. These steps will also include gaining necessary approvals for any major new facility recommended in the development plan, as well as environmental licensing.

Planning, scoping and implementing the near-term actions to prepare for the next IRP will also ensure we continue to advance integrated planning at Manitoba Hydro. These actions will prepare Manitoba Hydro to make complex decisions to optimize the electricity and natural gas systems. The 2025 IRP analysis also showed that Manitoba Hydro needs to prepare for future resource decisions beyond the 10-year development plan timeframe, so we will continue to examine and plan for high-potential options to fulfil energy needs past 2035.

As part of monitoring the change in the energy landscape, we will complete regular updates for our IRP analysis including assessing the supply-demand balance in Manitoba. By understanding how demand is changing relative to the assumptions in the 2025 IRP, as well as monitoring progress in implementing the recommended development plan, we can determine if we need to make different decisions to ensure reliability and best meet the energy needs of Manitobans.

Developing an IRP is not a one-time occurrence. Many utilities publish new or updated plans on a recurring basis. The time between published IRPs is different for each utility based on its unique needs. Given there is

uncertainty in the pace and scale of change under the energy transition, the timing of the next IRP will likely be determined based on observation and study of Manitoba-specific concerns, including our success in implementing the recommended development plan. By monitoring the signposts identified in the IRP, we will be able to assess any material changes that may trigger development of a new IRP or other, more specialized analysis in advance of the next IRP.

Through all this work, Manitoba Hydro will continue to engage with the energy planning community and build alignment with the Province of Manitoba, Efficiency Manitoba, the Public Utilities Board, customers and interested parties. Manitoba Hydro will share progress on near-term actions, the monitoring of signposts, and the outcomes of new analysis, carrying on the transparency established throughout development of the 2025 IRP.

8. Glossary

Term Definition

4 Ds: Four forces driving change in the energy landscape:

DECARBONIZATION:
The act of moving away from energy that produces carbon dioxide and other greenhouse gases (GHGs).

DIGITALIZATION:
Advancement in technology that is changing customer preferences and expectations of how they interact with their energy provider.

DECENTRALIZATION:
The increase of options for energy beyond those offered by utilities, many of which still rely on the power grid to allow two-way flow of electricity.

DEREGULATION:
Deregulation refers to the liberalization of the energy market and the removal of barriers for new entrants and innovative business models. This can increase the competition, transparency, and diversity of the energy sector, as well as foster social and environmental justice.

Absolute Zero: A state in which no greenhouse gases are emitted. Sometimes refers to emissions from a particular source (like electricity generation), or across the economy.

Adequate Supply: Evaluation metric referring to the ability of energy supply to meet future demand. Metric assumes the necessary infrastructure is in place to deliver the supply solutions in the potential development plan being evaluated. Metric considers the characteristics of the resource type meeting system needs. The feasibility of said infrastructure will be further measured in the Diversity and Technology Maturity Metrics.

Asset Life: Represents the weighted average life of the various components of a resource. Does not necessarily indicate the maximum life of a project, as a resource may last longer with additional major capital investment in component refurbishment or replacement. In the case of energy efficiency, this is the average of each of the various individual programs.

Average Energy: The average amount of electrical energy that a resource can produce based on a range of flow conditions. For hydropower options, this is the average amount of energy produced based on 110 years of flow history. For non-hydropower options, this represents the energy that would be expected under the same average of all flow conditions. For thermal resources, this is determined as part of the modelling process and will vary depending upon a range of factors. For variable resources this is equal to their average energy production.

Average of All Flow Conditions: A composite value from modelling over the full range of historic water flow conditions.

Avoided GHG Emissions (Avoided Emissions): Greenhouse emissions that are avoided or displaced through an entity's direct actions. Avoided GHG emissions are calculated based on determining the GHG emissions that would have occurred in the absence of the entity's direct actions. Avoided GHG emissions are not negative GHG emissions.

Behind-the-Meter (BTM): Equipment on the customer side of the electrical meter.

Biodiesel: A biofuel made from fats and oils, such as soybean oil or canola oil, and processed to be chemically the same as petroleum diesel. It meets the ASTM D975 specification for petroleum in the United States and EN 590 in Europe. This fuel can be used as a replacement fuel or blended with any amount of petroleum diesel.

Biofuel: A solid, liquid, or gaseous fuel derived from recently living biological material used for energy purposes.

Biofuel Credit: A credit which is an environmental commodity representing a unique unit of biofuel. Once acquired, biofuel credits can potentially be incorporated into an entity's fuel inventory to replace, on an accounting basis (but not a physical basis), an equivalent amount of fossil fuels.

These types of credits are utilized under the Clean Fuel Regulations and British Columbia's Low Carbon Fuel Standard and are similar in function to Renewable Energy Certificates.

Biomethane: A gas that meets the standard for injection into the nearest natural gas pipeline and that is either gas derived from the processing of biogas or synthetic natural gas derived from biomass.

Brownfield Site: A previously developed industrial site that may be underutilized, or which is no longer being used.

Business Case: Detailed decisions on individual assets with specific project decisions, such as location and project delivery.

Capacity: The maximum amount of electricity that can be made by generators at any particular time. Generally measured in megawatts (MW).

Capacity Expansion Planning Model: GSPRO

Carbon Capture and Sequestration (CCS): The capture and storage of carbon dioxide from emissions to prevent it from entering the atmosphere.

Carbon Neutral Economy : A vision of a future where Manitoba's economy either emits no CO2 or offsets emissions through measures such as capturing and storing greenhouse gases, planting trees, or other actions. CO2 emissions mainly stem from fossil fuel combustion, including stationary sources (fuel burning), transportation, and industrial activities.

Customer Direct Costs: An estimate of direct customer cost impacts. Metric considers the incremental costs customers would incur that would reduce utility costs in a development plan. This would include, but not be limited to, costs of distributed generation or upgraded efficiency electric heating systems. Metric does not include utility billing rates to the customer.

Customer Self-Generation : The generation of electricity by customer-owned and operated equipment which serves all or a portion of the customer's electricity needs.

Customer Side Solutions: Initiatives on the customer side of the electrical meter that reduce the amount of demand the utility would have to serve. This can include the efficiency plan projection, additional energy efficiency programming, and demand response and curtailable rate programs.

Demand Response (DR): The temporary reduction of customer electrical demand by the customer or directly by a utility in response to a signal. A utility may contract with customers with large electrical loads to provide demand response as a resource to manage peak electrical demand. Demand response is a type of demand side management. A signal may include a request from the utility due to high demand or reliability, a change in price, or an incentive.

Demand Side: Related to the demand for, or consumption of, electricity located on the customer side of the electrical meter.

Dependable Energy: The amount of electrical energy supplied during the equivalent of the lowest system flows on record (dependable flow conditions).

Dependable Flow Conditions: Waterflow in the hydraulic system (comprised of several major rivers, reservoirs, and hydropower stations) that is consistent with the conditions during the worst historical drought.

Development Plan: A long-term strategic plan for allocating and sequencing resources for the energy utility to meet future needs, such as building new generation resources or introducing programs to reduce energy consumption during peak times. These plans are tailored to specific goals, such as lowest cost, and specific context, such as energy policy.

Direct Air Carbon Capture & Sequestration (DACCS): DACCS technologies theoretically represent a variety of processes where CO2 is extracted directly from ambient air and permanently stored elsewhere, typically in geological formations deep underground. Unlike carbon capture & sequestration (CCS), DACCS can be located at essentially any location, and not only at a point source of CO2 emissions.

Dispatchable Resource: A resource with an assured fuel or input energy supply which can be started or stopped on command and whose output can be increased or decreased on demand to follow load. Examples include hydropower units, thermal generators, and batteries.

Distributed Generation: A system of decentralized energy generation and delivery that is located closer to points of consumption (typically behind the meter or near the end user). It can involve the production of electricity, heat, or both, through small-scale, modular, and other energy technologies.

Dual-Energy Source: Two energy sources for heating—electricity and natural gas.

Dual-Fuel: A heating system operated by a combination of fuels. For the 2025 IRP, dual-fuel typically refers to systems employing an air source heat pump and natural gas furnace.

Economic Opportunities: Potential benefits to the Manitoba economy and community well-being. This metric is used to compare potential benefits in potential development plans—benefits like economic development and job creation associated with the construction and operation of selected solutions as well as surplus energy and capacity, with the necessary ability to transmit and distribute that energy.

Economic Reconciliation: Potential to promote economic reconciliation with Indigenous peoples, Nations, businesses, and governments.

This metric considers the potential of a development plan to promote economic benefits for Indigenous peoples, Nations, businesses, and governments, such as employment and training opportunities, investment options (including ownership), opportunities for early project engagement, and participation in procurement

Efficiency Plan Projection: A projection of Efficiency Manitoba's 2025–28 planning analysis to achieve its legislated energy savings targets, extended to 2050.

Electric Vehicle (EV): Electric vehicle refers to a subset of zero-emission vehicles which use electricity as a source of fuel. EVs include battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV).

Electricity Generation GHG Emissions: GHG emissions directly attributed to the generation of electricity.

Emissions-Intensive Trade-Exposed (EITE): A descriptor of industries which emit large quantities of GHG emissions and compete internationally, such as iron and steel, pulp and paper, food and beverages, cement and concrete, and forest products industries.

End Use Energy: Energy directly used by individuals or organizations for various purposes. It represents the final stage of energy consumption, where energy is converted to meet specific needs or perform specific tasks. Examples of end-use energy include energy used for lighting, heating, cooling, transportation, appliances, industrial processes, and other applications at the point of consumption.

Energy: The amount of electrical energy produced or consumed over a period of time, measured in watt-hours (Wh).

Energy Efficiency: Energy efficiency refers to upgrading building and using technologies, strategies, and practices to reduce energy use. Examples include adding insulation to buildings, using more energy efficient appliances, and improving industrial processes.

Environmental Considerations (Non-GHG): The potential effects on the environment separate from the effects of GHG emissions. This metric considers the impacts on air, land, water, and people for a potential development plan (including from new generation, transmission, distribution, and pipeline resources). This metric factors in the mitigation measures, likelihood, severity, geographic extent, and duration of impacts, and monitoring requirements.

Firm Capacity: A guaranteed level of capacity that is intended to always be available during the timeframe being planned for.

Firm Energy Demand: Customer load, which a utility is obligated to serve under normal operating conditions and through defined equipment failures or other events.

Firm Export Capability: The amount of transmission capacity that must be available for the export of electrical energy during a certain period of time.

Firm Import Capability: The amount of transmission capacity that must be available for the import of electrical energy during a certain period of time.

Flow Year: One year of monthly inflow data corresponding to one of the 112 years of historical inflows available within the capacity expansion planning and production costing models.

Forced Outages: An unplanned event resulting from a component failure or other condition which requires a generating unit to be made unavailable immediately or up to the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday).

Fuel-Based Resources: Combustion turbines that use fuels, including natural gas, hydrogen, and biomethane, to produce electricity.

Greenhouse Gasses (GHGs): Atmospheric gasses, such as CO2, methane, and other gasses, that trap heat and contribute to climate change.

Installed Capacity: The maximum amount of electricity that a generating station can produce under specific conditions designated by the manufacturer. Alternative terms include rated capacity and nameplate capacity.

Intermittent Resource: A generating resource that is not dispatchable due to the fluctuating nature of the energy source. This term typically applies to wind and solar resources. An alternative term is Variable Resource.

Interruptible: Customer load which, by agreement that offers payments or preferential rates, a utility is not obligated to serve.

Key Inputs: Key inputs include load projections and resource options strategies, which have significant uncertainty impact on the analysis.

Large Hydro: Hydroelectric generation with a capacity of several hundred megawatts.

Least Regrets: An analysis approach that evaluates how much regret (or not) that may occur by simulating commitment to build various resources if the future unfolds differently than you assumed. Regret can be quantified as overbuild and underbuild.

Levelized Cost of Energy: A standard simplified cost metric for comparing resources based on the cost of producing a unit of energy ($/MWh). It is the present value of a resource's capital cost, fixed and variable operating costs, fuel costs, and taxes, divided by the present value of the average expected energy produced over the life of a resource. This simplified metric does not allocate costs for capacity and should only be used when comparing the cost of energy between similar resources.

Levelized Cost of Winter Capacity: A standard simplified cost metric for comparing a resource based on the cost of providing a unit of capacity ($/kW-yr.). It is the present value of a resource's capital cost, fixed operating costs, and taxes, divided by the present value of the firm winter capacity provided over the life of a resource. This simplified metric does not allocate costs for energy produced and should only be used when comparing the cost of capacity between similar resources.

Load Projections: Load projections represent future demand for natural gas and electricity that Manitoba Hydro might have to supply.

Negative GHG Emissions (Negative Emissions): Negative GHG emissions are the result of the physical removal of carbon dioxide from the atmosphere. Negative emissions differ from avoided emissions in that a negative emission removes an emission that has already occurred. Negative emissions can be achieved through either natural processes or technological innovations and can be located away from the point source.

Net System Cost: Manitoba Hydro's costs for electricity and natural gas service including capital and operating costs for new and existing resources; electrical generation, transmission, and distribution infrastructure; electrical generation fuel costs; water rentals; import costs; export revenues; natural gas distribution costs; and customer natural gas costs. Excludes financing costs for new capital spending.

Net-Zero: A target, or a descriptor of a target, in which GHG emissions from defined activities are reduced to zero or are offset by other emissions reductions. This may be physical emissions reduction or removal, or credits representing such reductions.

Net-Zero Economy : Net-zero economy means a future where Manitoba's economy no longer emits any greenhouse gas emissions or removes/offsets any remaining emissions by capturing and storing emissions, planting trees, or other actions.

Net-Zero Grid: A net-zero grid typically refers to removing an equal amount of greenhouse gas emissions as are emitted from electricity generation in a particular jurisdiction.

Net-Zero Ready: A resource or load which currently has associated GHG emissions which may be eliminated or offset by future adaptations such as the use of alternative fuels (e.g., hydrogen replacing natural gas in a generator) or the addition of carbon free energy sources (e.g., solar panels added to a building).

Nominal Capacity: The approximate installed capacity rating of a generation plant based on normal operating conditions.

Non-Firm Capacity: Generating capacity that lacks a guarantee of continuous availability under all conditions.

Non-Utility Generation: A source of electricity connected to the electrical transmission and distribution system but not owned by an electric utility.

Non-Wires Solutions / Non-Wires Alternatives (NWS/NWA): An inclusive term for electrical grid investments that eliminate or defer the need to construct or upgrade components of generation, transmission, or distribution systems. Examples can include demand response, dynamic retail pricing, customer self-generation, energy storage, conservation or energy efficiency measures, and distributed generation.

Offset (Offset Credit): An offset credit, which is an environmental commodity, is issued under an established offset protocol. An offset represents either a GHG emissions reduction or a GHG emission removal. For GHG accounting purposes, one offset credit is equal to negative 1 tonne CO2e. Once acquired, offset credits can be included in an entity's (or province's) GHG emission inventory to reduce their net GHG emissions.

Opportunity Energy: Surplus energy quantities Manitoba Hydro has available for Opportunity Exports after meeting firm load and export commitments.

Opportunity Exports: Short-term economic Opportunity Energy sales to electricity markets outside of Manitoba.

Opportunity Imports: Short-term economic energy purchases from electricity markets outside of Manitoba to reduce production costs or to replenish energy in storage.

Peak Demand: The single greatest demand requirement for electricity (MW) or natural gas (m3) within a specific time period (e.g., year). Manitoba's annual peak demand for both electricity and natural gas occurs during the winter due to customer heating needs.

Planning Assumptions: Assumptions, internally determined, that underpin the development of the key inputs and the scenarios.

Planning Criteria: Constraints used in Manitoba Hydro's energy planning to ensure that peak electricity demand and day-to-day energy requirements are reliably met by the Manitoba Hydro electric system over the long-term.

Planning Reserve Margin: The margin of additional Firm Capacity in excess of Firm Energy Demand which must be provided to protect against capacity shortfalls resulting from the breakdown of generation and transmission equipment or increases in peak load due to extreme weather conditions.

Power (electrical): The rate at which electricity is produced by a generator typically measured in megawatts (MW). It is an alternative general term for capacity.

Provincial GHG Emissions: GHG emissions from sources within the province of Manitoba; for the 2023 IRP, Provincial GHG Emissions metrics focus on energy use-related source categories, which include electricity generation, other forms of stationary combustion, and transportation.

Recommended Development Plan: The most beneficial option selected from a range of potential development plans, evaluated using predetermined metrics and methodologies. This plan balances values against trade-offs, offering the best approach within the set evaluation criteria. The plan includes a clearly defined timeline and reflects both near-term priorities and long-term strategic goals.

Reduction Offset: One of two broad categories of offsets (along with removal offsets). Reduction offsets represent avoided GHG emissions. Reduction offsets are not additional in a legislated/regulated net-zero economy.

Regional GHG Emissions: A broader GHG perspective that estimates the net impact of Manitoba Hydro's system operations on the regional electricity generation sector. This metric includes net GHG emission changes from fossil-fuel electricity generators in the U.S., Ontario, and Saskatchewan in addition to GHG emissions from all of Manitoba Hydro's fossil-fuel generators.

Removal Offset: One of two broad categories of offsets (along with reduction offsets). Removal offsets represent negative GHG emissions and, because they reflect the permanent removal of GHGs from the atmosphere, are the purest form of offset. Removal offsets are additional in a net-zero economy.

Resource Options Strategy: Collection of reasonable resourcing constraints set in the Capacity Expansion Planning Model which can be paired with varying load projection assumptions to create scenarios for GSPRO modelling. These pairings are identified in the 2025 IRP modelling plan.

Road Map: A tactical guide outlining near-term actions and key indicators to prepare for and adapt to changes in the energy landscape.

Scenario(s): Represents an energy future based on a combination of a Load Projection and a Resource Options Strategy. Scenarios are analyzed through capacity expansion modelling to produce a development plan, with results extending to 2050.

Scope 1 GHG Emissions: Direct GHG emissions associated with activities over which a reporting entity has direct control. These emissions could be combustion of fossil fuels for various activities that occur within the boundaries that the reporting entity has defined. E.g., fleet vehicle use of gasoline/diesel/propane, natural gas combustion for heat, etc.

Scorecard: A scorecard is a tool used to measure and evaluate performance based on specific metrics and criteria.

Seasonal Coefficient of Performance (SCOP): For a heat pump, refrigerator, or air conditioning system, the ratio of heating or cooling output over the electrical input averaged over a heating or cooling season.

Seasonal Diversity Exchange or Diversity Agreement: The sharing of resources that allow utilities whose peak loads occur in different seasons of the year (winter peak vs. summer peak) to exchange surplus generating capacity with each other during their respective off-peak seasons.

Sensitivity: The study of the impact of changing a single variable in a complex analysis, e.g. changing an input or assumption the Capacity Expansion Planning Model to address a specific question or respond to specified areas of interest or uncertainty.

Small Modular Reactors: A nuclear reactor with up 300 MW capacity, or a combination of smaller reactors

Supply Side: Related to the supply or production of electricity located on the utility's side of the electrical meter.

Supply Side Enhancements/Enhancement to existing hydropower: Upgrades to existing hydropower generating stations, provides additional capacity but no energy.

Technologically Feasible: Meeting the minimum criteria for analysis by various planning experts. Capacity Enhancement Planning Model outputs will meet the resource selection and system operating criteria built into the model, then be analyzed by Capacity Enhancement Planning experts. The results will then be analyzed by subsequent experts to validate if they meet their minimum criteria.

Technology Maturity: Consideration of the risks and opportunities of various technologies. This metric will consider the maturity and risks of emerging technologies in a potential development plan including generation, transmission, distribution, and natural gas resources.

Technology Neutral: Describes an approach that remains impartial to specific technologies or energy sources. It objectively assesses all available options—such as solar, wind, natural gas, hydropower, nuclear, and more—based on their costs, benefits, and overall impact.

Time of Use/Time Varying Rates (TOU, TVR): Time-of-Use, or Time-Varying Rates, refer to rates for electrical consumption which are not fixed but vary to reflect the changing cost to produce and deliver electricity to customers. Examples include time-of-use rates with predefined daily, weekly, or seasonal patterns, and rates that are not pre-defined, but which vary with power system conditions including critical-peak pricing rates, peak time rebates, variable-peak pricing rates, and real-time pricing rates.

Total Customer Side Solutions: The combined demand savings of all applicable customer side solutions, which may not include all types of customer side solutions depending on the context.

Utilization Factor: The ratio of expected or average energy produced by a resource option on, typically on an annual basis, to the maximum possible energy produced during continuous operation. A measure of how often a resource will be used.

Variable Resource : A generating resource that is not dispatchable due to the fluctuating nature of the energy source. This term typically applies to wind and solar resources. An alternative term is Intermittent Resource.

Wholesale Energy/Markets: A centrally operated bulk power market for the purchase and sale of electricity across a specified region.

Winter Firm Capacity: The power generated or avoided (in the case of demand side management) by a resource during Manitoba's peak demand hours through the winter months.

Zero-Emissions Vehicle (ZEV): A vehicle that can function with no operating GHG emissions. Examples include battery-electric, plug-in hybrid electric, and hydrogen fuel cell vehicles as well as those fueled by alternative fuels such as biodiesel.

9. Summary of Appendices

Appendix 1 – Updates since the 2023 Integrated Resource Plan

Manitoba Hydro's last IRP was published in 2023. Planning is an ongoing, iterative practice, building on understandings gained from each study and deliverable. This appendix provides the reader with an overview of the planning activities and milestones accomplished since the 2023 IRP.

Appendix 2 – 2025 IRP Development Process

Manitoba Hydro's 2025 IRP is only the second published by the utility. The purpose of this appendix is to help the reader navigate through the steps from planning to arriving at and then delivering a recommended road map.

Appendix 3 – Existing System

The purpose of this appendix is to give the reader an overview of the current state of the existing system.

Appendix 4 – Policy Landscape

Integrated resource planning—of which an IRP is one part—is impacted by policy in many ways including inputs, assumptions, and methodology, through to how to communicate and seek approval. This appendix provides information on energy policy updates or evolutions that have had an influence on the 2025 IRP.

Appendix 5 – Load Projections

This appendix provides context on load projections for the key inputs and scenarios of the 2025 IRP. It outlines assumptions and the rationales for those assumptions relating to projected load growth to 2050.

Appendix 6 – Resource Options

This appendix provides detail on the characteristics of the resources from which the model can select.

Appendix 7.1 – Modelling and Analysis Approach

An IRP study is focused on modelling and analyzing potential futures is a key aspect of an IRP. This appendix explains how the models work, how they and are used, and how the model outputs are analyzed.

Appendix 7.2 – Modelling and Analysis Results

This appendix contains explanations and illustrations of modelling outputs and analysis observations.

Appendix 8 – Evaluations

Manitoba Hydro's 2025 IRP considered metrics beyond those typically used in a traditional IRP. This appendix outlines evaluation metrics, and how they were used, and the results of evaluation.

Appendix 9.1 – Financial Analysis

This appendix narrows its focus to the shortlist of potential development plans and provides financial analysis, including a rate impact analysis, for Manitoba Hydro's electric and natural gas segments.

Appendix 9.2 – Risk Analysis

This appendix explains our analysis of risks associated with potential development plans considered in the 2025 IRP.

Appendix 10 – Major Facility Review Status Report

The Manitoba Hydro Act states that any Manitoba Hydro IRP must contain a status of any review required for major new facilities in the upcoming 10 years. The 2025 IRP recommends developing major new facilities, and this appendix provides a status update on any submissions or planning activities that have occurred.

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