Appendix A

Engagement Report Supporting Material

Manitoba Hydro
energy for life

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Introduction

This appendix to the 2025 IRP Engagement Report is a record and repository of the engagement materials, reports and documentation developed for Manitoba Hydro's 2025 Integrated Resource Plan. It provides additional details on engagement processes, activities, materials, and reporting. It includes the following sections:

1. **General Public**
2. **Interested Parties**
3. **Indigenous Nations Leadership**
4. **Large Industrial Customers**
5. **Municipalities**
6. **Technical Advisory Committee**

Each section contains engagement materials such as interview and survey questions, survey distribution methods, reports summarizing survey and interview feedback, presentations, handouts, and meeting notes. Engagement opportunities for Indigenous Nations are documented in all sections except for Large Industrial Customers, and Municipalities.

1. General Public

Engagement on the 2025 IRP began in November 2024 with a broad general public survey. The survey focused on seeking feedback about the factors and priorities Manitobans value when it comes to energy planning and understanding future energy decisions they may be contemplating. The following information is provided subsequent sub-sections:

- 1.1. Round 1 Survey Questions
- 1.2. Round 1 Survey Promotional Materials Distribution
- 1.3. Round 1 Promotional Materials and Information Handouts
- 1.4. Round 1 Survey Report
- 1.5. Round 2 Survey Questions
- 1.6. Round 2 Survey Promotional Materials Distribution
- 1.7. Round 2 Promotional Materials and Information Handouts
- 1.8. Round 2 Survey Report

1.1. General Public Round 1 Survey Questions

Share your thoughts:

A survey is available for all Manitobans to share their thoughts about energy and the energy future in Manitoba. Your answers will help as we continue planning to bring you safe, reliable electricity and natural gas for years to come.

Introduction

The world of energy is changing, and Manitoba Hydro is hard at work planning and preparing for the future. As we plan for our energy future, we would like to gain insight into your perspectives, priorities, and thoughts about the energy future in Manitoba.

All Manitobans have a part to play. By sharing your ideas around energy in Manitoba, you can be part of creating our energy future.

All survey responses are confidential.

If you have any questions or concerns about this survey, contact us. If you have questions about your service from Manitoba Hydro, please visit our Contact Us page.

Who's Listening: The Customer Research Team at Manitoba Hydro

Survey Questions

1. Many factors will be considered as we evaluate future energy options in Manitoba. How important do you think each of the factors below is for Manitoba Hydro to consider?
   (Scale: Very Important, Somewhat important, Somewhat unimportant, Not at all important, Don't know)
   1) Reducing greenhouse gas emissions
   2) Protecting the environment
   3) Minimizing the frequency and length of outages
   4) Reducing new infrastructure costs
   5) Minimizing customer rate impacts
   6) Promoting economic development

2. What other factors do you think should be considered as we make future energy decisions? (open-text)

3. Manitoba Hydro will have to make choices and prioritize factors as we plan for our future energy options. Help us understand how you think Manitoba Hydro should prioritize the same factors you just rated. Allocate 100 points among the factors based on how important you think they are in relation to each other.
(Note: More important factors should receive more points than less important ones. You don't have to give all the items listed below points but you do have to use up all your 100 points.)

1) Reducing greenhouse gas emissions
2) Protecting the environment
3) Minimizing the frequency and length of outages
4) Reducing new infrastructure costs
5) Minimizing customer rate impacts
6) Promoting economic development
7) Don't know

4. Tell us more about how you chose your priorities. What were you considering as you decided how to allocate your points? (open-text)

5. The energy related decisions our customers make now and in the future impact how we plan to meet Manitobans' energy needs. Are you considering making any of the following energy related changes? (Scale: Have already made this change, Considering this change within the next 2 years, Considering this change in the next 3-5 years, Considering this change in the next 6-10 years, Not considering this change, Not applicable)

1) Switching gas space heating to electric
2) Switching space heating to a ground or air-source heat pump
3) Purchasing an EV for your personal use
4) Upgrading capacity to add EV charging capability to your home
5) Adding solar panels to your home
6) Installing smart home devices to better track and manage your energy use
7) Adding battery storage capacity at your home.

6. Taking into account everything you know about the energy transition and your current perceptions of Manitoba Hydro, to what extent do you agree or disagree that Manitoba Hydro has your best interests at heart as it relates to future energy planning?

a) Strongly agree
b) Somewhat agree
c) Neither agree nor disagree
d) Somewhat disagree
e) Strongly disagree

7. What experiences make you feel this way? (Open-text)

8. What else should we know about your questions and comments related to future energy planning in Manitoba? (Open-ended)

9. Would you like to learn more about energy planning in Manitoba and participate in future customer research?
    a) Yes, I'm already on the list
    b) Yes, please add me to the list (Contact Info – Pop-up Name Company or Organization, and Email Address)
    c) Not at this time

10. Are you a current or past employee of Manitoba Hydro?
    a) Yes, a current employee
    b) Yes, a past employee
    c) No

11. Thank you for your feedback. Helping us know a bit more about you will help us understand how we can plan for your long-term energy needs. Would you be willing to answer a few more questions related to your demographics and your personal attitudes and behaviours towards energy and technology?
    a) Yes
    b) No = End Survey

The following optional questions relate to demographics and your personal attitudes and behaviours towards energy and technology. We are asking these questions to help us understand you better as a customer and identify customer segments. Customer segments help us to understand trends among groups and determine how we can best plan for the long-term energy future in Manitoba.

12. What are the first 3 characters of your postal code?

13. What age category do you fall into?

a) Younger than 18
b) 18-24
c) 25-34
d) 35-44
e) 45-54
f) 55-64
g) 65-74
h) 75 or older
i) Prefer not to answer

14. Would you describe yourself as an Indigenous person - a person of First Nations, Métis, or Inuit ancestry?

a) No
b) Yes, First Nations, on-reserve
c) Yes, First Nations, off-reserve
d) Yes, Métis
e) Yes, Inuit
f) Prefer not to say

15. Are you: (Please select all that apply.)

a) White
b) South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
c) Chinese
d) Black
e) Filipino
f) Arab
g) Latin American
h) Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.)
i) West Asian (e.g., Iranian, Afghan, etc.)
j) Japanese
k) Korean
l) Other group [Please specify]
m) Prefer not to answer (mutually exclusive)

16. How interested are you in new technology?

a) Very interested
b) Somewhat interested
c) Not very interested
d) Not at all interested
e) Don't know

17. Which of the following statements comes closer to your view?

a) When I hear about new ideas and technologies, I get excited by their potential benefits
b) When I hear about new ideas and technologies, I tend to worry about the potential risks
c) Don't know

18. In the past year, how much have you spent researching energy products or actions to reduce your environmental impact?

a) More than 4 hours
b) 2-4 hours
c) 1-2 hours
d) Less than 1 hour
e) Don't know
f) None

19. How often do you take action to reduce everyday energy usage? E.g. washing laundry in cold water, hanging laundry to dry, cooking or reheating food using a microwave, turning down heating/air conditioning/water heater etc.

a) Always
b) Often
c) Sometimes
d) Rarely
e) Never
f) Don't know

20. How often do you monitor your energy use and adjust devices or appliances to reduce it?

a) Always
b) Often
c) Sometimes
d) Rarely
e) Never
f) Don't know

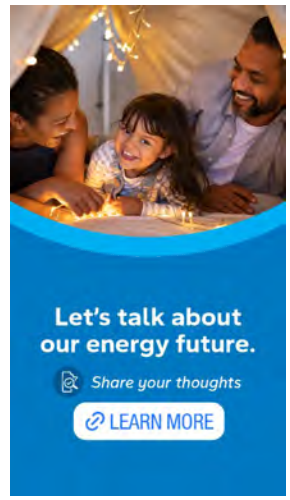
21. When it comes to the energy transition, some customers are saying they expect their energy utilities to take the lead by investing rapidly in new infrastructure and encouraging new energy choices, while others would prefer a wait-and-see approach, holding off on major investments until more information is available.

Which statement below best describes the approach you believe Manitoba Hydro should take when it comes to the energy transition?

a) Manitoba Hydro should be a leader in the energy transition
b) Manitoba Hydro should wait to see what other utilities do first
c) Manitoba Hydro should just focus on maintaining the current system and not worry about the energy transition at all
d) Don’t know enough to say

1.2. General Public Round 1 Survey Promotional Materials Distribution

The Round 1 public survey was shared and open to the public for response between November 5, 2024, and December 19, 2024. While the survey was open, it was widely promoted across the province, with an invitation to participate through a range of communication tools and in both English and French, using both direct and indirect methods. Additional efforts were undertaken to encourage the participation of those living in First Nation communities through geographically targeted social media ads and direct mail.



- **Email outreach:** Direct email invitations to participate in the customer survey were distributed to approximately 276,000 online billing customers. A direct email promoting participation in the survey was also sent to approximately 4,600 existing IRP subscribers. Direct emails resulted in the highest volume of survey responses at 5,160 of the total 6,800 survey responses received.
- **Event postcards:** Branded postcards were handed out at various community events to advertise and encourage customers to complete the survey. These included:
  - o Customer Service Centre Counter Signage
  - o at Manitoba Hydro Place during the Santa Clause Parade, November 16, 2024 -
  - o Association of Manitoba Municipalities Fall Tradeshow and conference, November 25, 2024
  - o Manitoba Chamber of Commerce Holiday Reception, December 4, 2024
- **Project website updates:** The project website was updated and included a link to the survey.
- **Energy Matters newsletter:** This print publication advertised the survey and asked customers to share their ideas around energy. The article contained a link and QR code to the survey, project updates, and a link to the IRP website. It was intended to be sent to all paper billing customers (approximately 275,000) in November 2024, but due to the postal strike, approximately 50% (137,000) received the newsletter.
- **Social media campaign:** Organic and paid social media was used to encourage Manitobans to take the survey and visit the project website to learn more. The campaign took place on Instagram, Facebook, and LinkedIn and resulted in approximately 9,441 clicks.
- **First Nations postcards:** Paper postcards were sent by mail to the approximately 17,500 residential customers located in First Nations communities to encourage them to take the survey.

- **First Nations Geographically focused Social Media Outreach:** Additional efforts to reach residential customers located in First Nations communities was taken via social media (Facebook) and resulted in approximately 3,100 clicks.

1.3. General Public Round 1 Promotional Materials and Information Handouts

This section includes the following materials:

- Postcard
- Information Handout: *2023 Integrated Resource Plan Signpost Update*
- Information Handout: *Our Development Process*
- Article: *Survey to inform 2025 IRP now live: share your thoughts about our energy future*
- Article: *What is the energy transition?*

Let’s talk about our energy future.

Share your thoughts

Manitoba Hydro
energy for life

Share your ideas around energy and help inform our future

The world of energy is changing and we all have a part to play in our energy future.

Our survey is available until **December 19** asking questions related to decisions on energy use and what matters to you when it comes to your energy.

Your answers will help inform our energy future.

Share your thoughts
hydro.mb.ca/future/feedback

To request accessible formats visit hydro.mb.ca/accessibility.

2023 Integrated Resource Plan signpost update

Reading the signs to help you navigate the energy transition

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

Signposts – how we recognize change

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

These signposts include:

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

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

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

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

To request accessible formats visit hydro.mb.ca/accessibility.

October 2024 signpost updates – changes since the 2023 IRP

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

Government actions

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

Provincial government actions

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

Federal (Canadian) government actions

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

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

International government actions

United States of America (U.S.)

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

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

United Nations

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

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

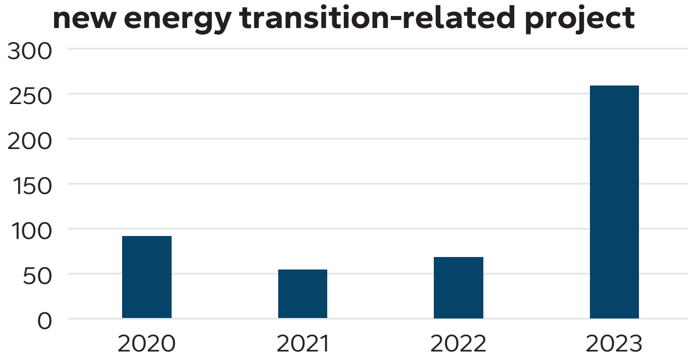
Customer decisions

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

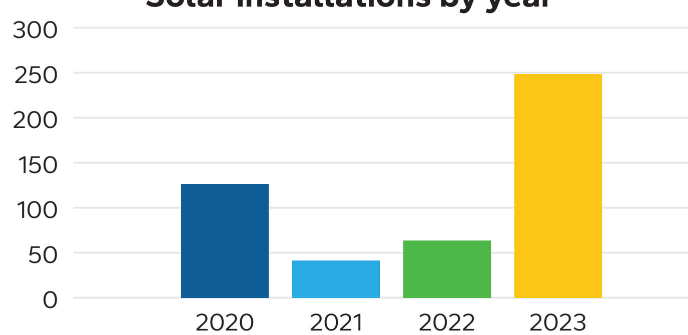
Since the 2023 IRP, we've observed several trends relating to customer decisions:

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

Total requested MW by year new energy transition-related project



Solar installations by year

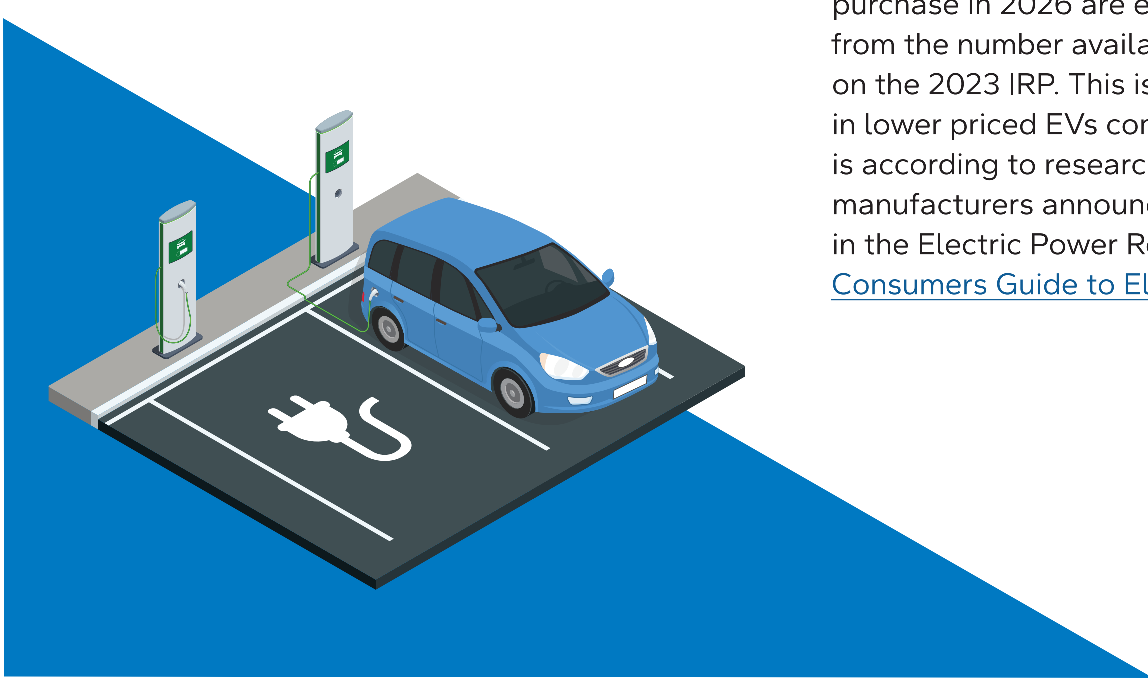


Electric vehicles (EVs)

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

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

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



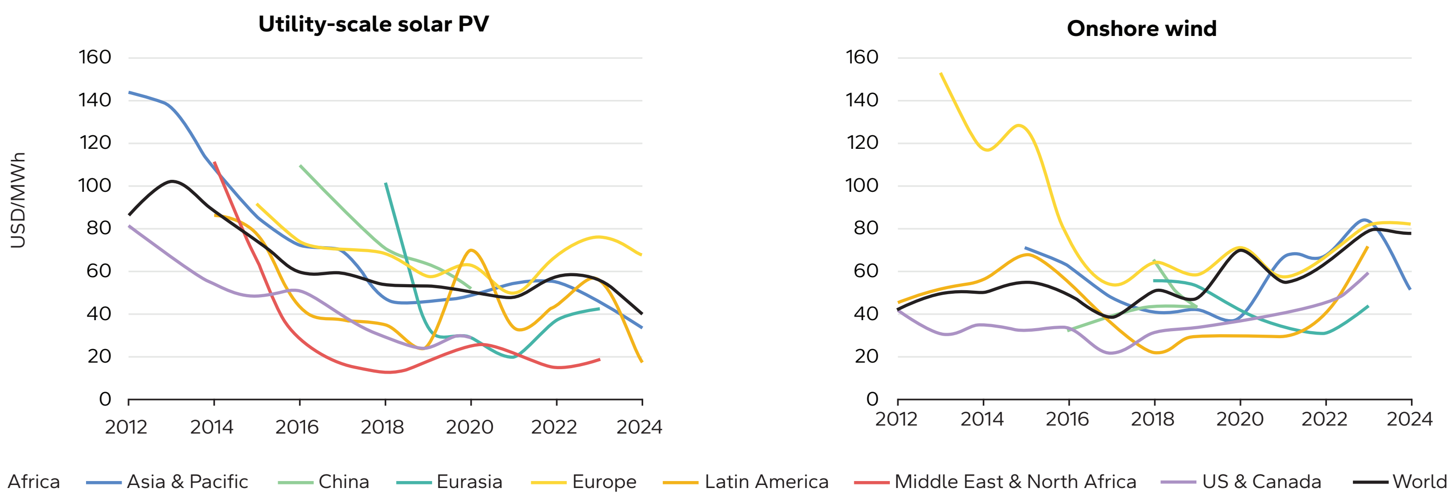
Technologies & markets

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

Technologies

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

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



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

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

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

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

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

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

Markets

- Canadian utilities are seeking to greatly expand their generating capacity as they project significant increases in their customer's energy needs.
  - In March, 2024, the Independent Electric System Operator released its IESO Annual Planning Outlook that anticipates, "demand will, on average, increase two per cent a year over the coming decades, from 154 TWh in 2025 to 245 TWh by 2050." This growth is driven primarily by economic and population growth as well as industrial electrification and growth. "Daily electricity use patterns are also changing as consumers embrace electric vehicles, industry begins to electrify their processes and local greenhouses continue to increase agricultural production. The latest forecast shows Ontario transitioning from a summer-peaking region to a dual-peaking region beginning in 2030."
  - The Alberta Electric System Operator released their AESO 2024 Long-Term Outlook that forecasts higher growth in electricity demand from its 2021 Outlook, explaining that "This difference is largely driven by elements of the energy transition including accelerated adoption of EVs and electrification of building heating and cooling, which have a more pronounced long-term effect on load growth..." The compound annual growth rate in its latest forecast to 2043 is 1.2% compared to 0.4% from 2022 to 2041 in its previous 2021 Outlook.

- To serve this increased demand, most Canadian utilities are focused on a future resource mix with low operating emissions. It is unclear whether this cumulative demand will put upward pressure on the cost to acquire new generating resources, as there could be competing demand on supply chains and for skilled labour to bring new resources online. The following are examples of Canadian utility development plans:
  - In September 2024, BC Hydro closed their first 'call for power' in 15 years with a request for proposal (RFP) to acquire 3,000 GWh/year of new renewable generation by as early as 2028. BC Hydro's RFP requires "projects that have a meaningful First Nations partnership component."

- Hydro Quebec announced their development plan, with a cost of up to $185 billion, to reinvest in their existing system, acquire 10,000 MW of new wind, and add 3,800 MW to 4,200 MW of new hydropower by enhancing existing generating stations and developing new facilities. In addition, Hydro Quebec states that a priority of the development plan is to "facilitate the financial or economic participation of Indigenous communities in new infrastructure projects."

- NB Power has issued a Request for Expressions of Interest for new power sources. They are inviting proposals for wind, solar, and tidal power to produce up to 220 MW of electricity and up to 50 MW of energy storage. The goal is to have these projects operational by July 2027.

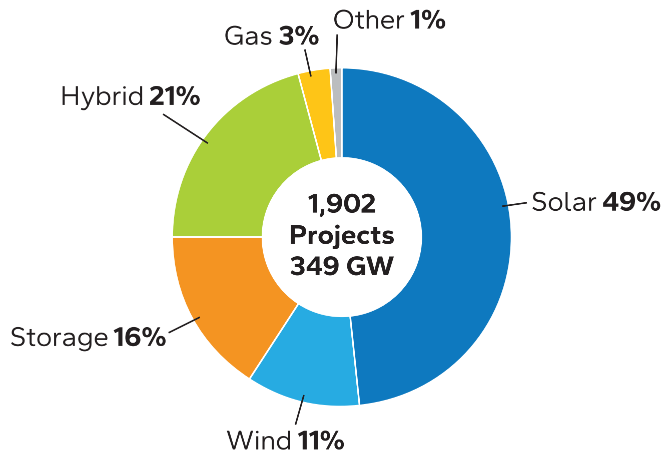
- MISO Transmission Build-out: The Midcontinent Independent System Operator (MISO), of which Manitoba Hydro is a coordinating member, is developing a greater than $17B transmission build-out, described as a 765 kV "interstate highway system for electricity". This is expected to reduce market prices across MISO, particularly those related to transmission congestion, where prices have become inflated due to transmission 'bottlenecks' which prevents more affordable electricity from being able to reach customer loads. This is part of a larger $30B transmission development proposal.

- By 2042, the Midcontinent Independent System Operator's (MISO's) installed capacity is projected to be more than double its current levels, with a significant shift towards energy sources like wind and solar. The increasing use of these resources is related to a decline in their cost, as the cost of new wind and solar has made existing coal-based electricity generation less competitive and resulted in an acceleration of retirements of coal generation. While coal is in decline, natural gas generation capacity is not expected to decline due to its ability to quickly provide critical dispatchable capacity when wind and solar are not producing.

- MISO's recent 'Organization of MISO States' survey indicates that in the coming years, due to significant increases in new loads and the retirement of fossil fuel generation, particularly coal-based generators, there needs to be a "dramatically accelerated pace of new [generation] build" to not have demand exceed supply within MISO. If this issue is not resolved, it could put upward pressure on electricity prices in MISO.

- The MISO current active interconnection queue (e.g., new resources requesting to connect to the MISO grid) has grown exponentially compared to 2021 with the biggest rise seen in solar, hybrid and storage. These projects are expected to come online over the next few years.

MISO active interconnection queue as of June 2024



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

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Planning for our energy future

OUR 2025 INTEGRATED RESOURCE PLAN

Our Integrated Resource Plan (IRP) is a repeatable process used to understand and prepare for our province's future energy needs.

Energy – how it's made, how it's delivered, and how it's used – is changing.

The energy transition is already in Manitoba. Electricity demand in our province is growing, and Manitoba Hydro's supply is limited. It will take time to build new sources of generation and implement programs to reduce consumption. Our 2025 IRP will result in a development plan to ensure a safe, reliable, supply of electricity and natural gas, and leverage the opportunities presented by the energy transition.

OUR DEVELOPMENT PROCESS

Our 2025 IRP process will use the following steps and include input from customers, interested parties, and the Manitoba energy planning community.

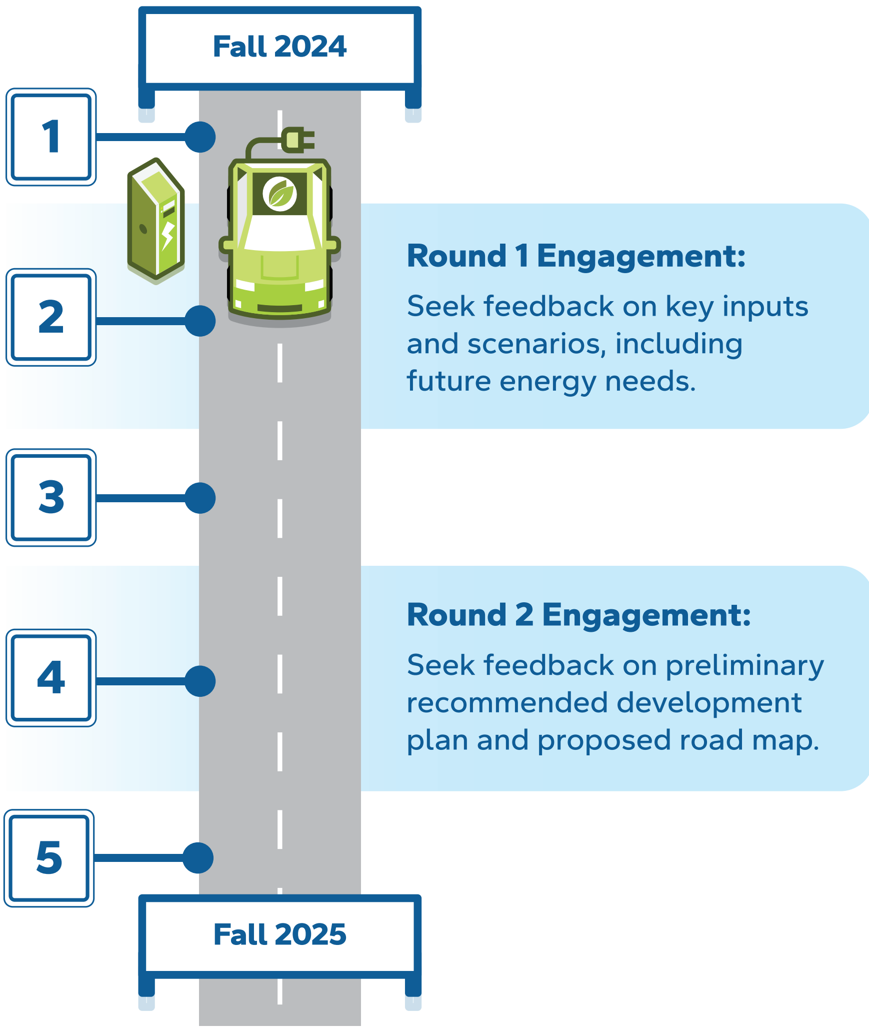
1. **Setting direction.** We set the direction of the 2025 IRP by identifying its purpose and what to include. This helps everyone understand what to expect.

2. **Develop key inputs and scenarios.** We gather information and data from a wide variety of sources to outline key inputs and develop scenarios used in the IRP. We also establish the evaluation metrics in this phase before we start our modelling and analysis.
   - **Key inputs** include load projections and resource options strategies. They have significant uncertainty and impact on the analysis. Planning assumptions that vary by scenario are included in these key inputs.
   - **Scenarios** represent an energy future. They are a likely combination of a specific load projection and resource option strategy.
   - **Evaluation metrics** are established to be applied to the modelling and analysis outputs.

3. **Modelling, analysis and evaluations.** Our experts use specialized computer models to test how Manitoba Hydro may serve future energy needs in the various scenarios. These modeling and analysis outputs let us know what may be needed for building new generation, managing peak demand, creating programs to reduce consumption, and delivering energy to our customers. We will compare and evaluate the modelling and analysis outputs to see how they align with Manitobans' energy needs.

4. **Preliminary recommendation.** From the evaluation of the modelling and analysis, we'll draft a preliminary recommended development plan for meeting the needs of our customers for years to come. We will share and seek feedback on this draft plan and proposed road map outlining what actions are needed now to prepare for the energy future.

5. **Finalize the Integrated Resource Plan.** After reviewing feedback, we'll finalize the recommended development plan and road map, and publish the IRP in Fall 2025.



Let's talk about our energy future.

Hearing from you helps us better understand your changing needs and priorities.

hydro.mb.ca/future

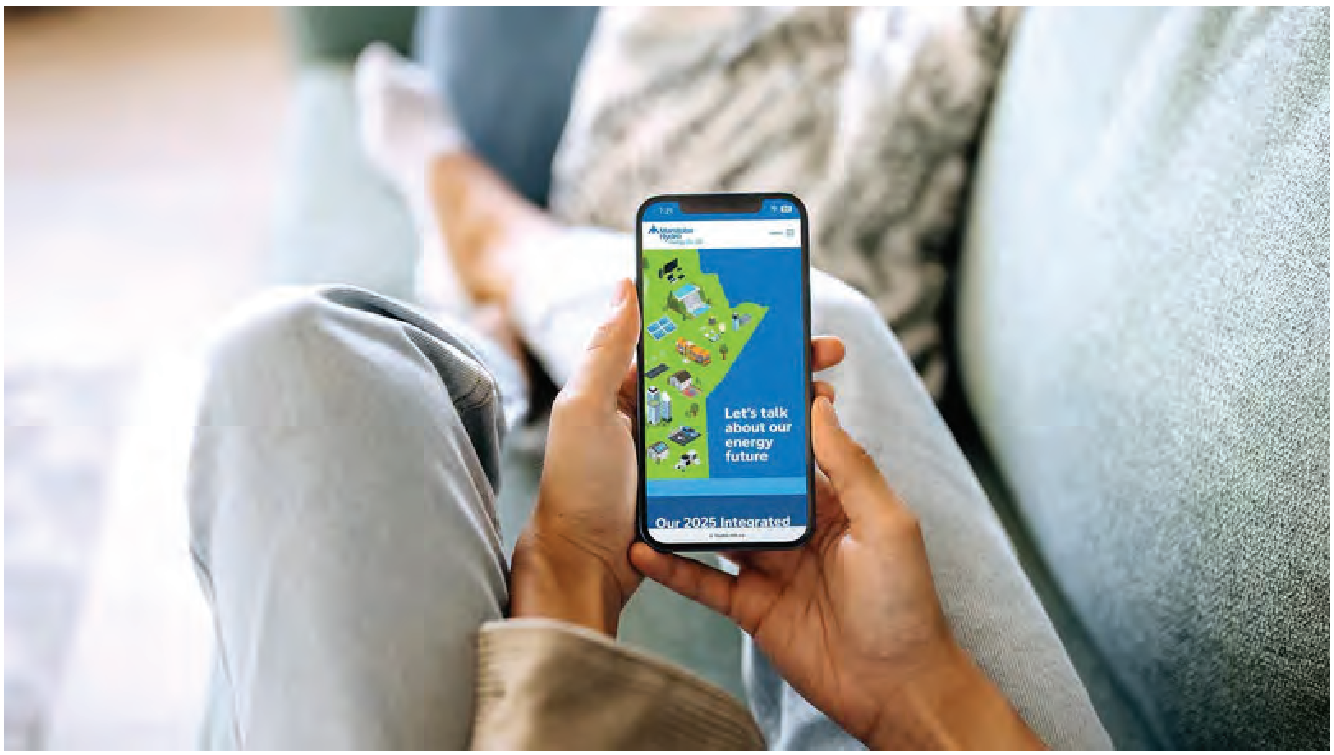
Manitoba Hydro can't take these steps alone. We are continuing to work together with Manitobans and the energy planning community to navigate the energy transition, with opportunities to provide feedback at various stages throughout the development of our 2025 IRP.

Curious about the energy future, the factors influencing the energy transition, or Manitoba Hydro's Integrated Resource Plan? Visit **hydro.mb.ca/future** to learn more and to subscribe to our mailing list to follow along for updates and to share your feedback as we develop the 2025 IRP.

Manitoba Hydro
energy for life

WORKING FOR YOU

Survey to inform 2025 IRP now live: share your thoughts about our energy future



This article was published in November 2024 and may be outdated.

Public engagement has begun for Manitoba Hydro's 2025 Integrated Resource Plan (IRP).

From now until December 19, a survey is available for all Manitobans to share their thoughts on their future energy use and what matters to them when it comes to their energy.

Complete the survey (https://manitobahydro.ca1.qualtrics.com/jfe/form/SV_0vlQjz8GscaAwsK?Source=website-en&Medium=blog-post-en)

Answers to the survey will help us inform the development of our 2025 IRP, which will help us prepare to continue bringing safe, reliable electricity and natural gas to you in the years to come. The 2025 IRP will include a recommended development plan.

Conducting an engagement survey on this scale (alongside targeted conversations with interested parties) helps ensure our IRP reflects a variety of perspectives from across Manitoba as we work to power the province we call home, now and into the future.

2025 IRP to result in a recommended development plan

"We know from our work on the 2023 IRP that in order to meet future energy needs, we're going to need to invest," said Lindsay Melvin, Director of Integrated Resource Planning at Manitoba Hydro. "We also know from our ongoing energy planning that we're going to need new energy supply as early as 2029. When complete, the 2025 IRP will go a step further and outline how we meet those future energy needs across both our electricity and natural gas systems."

To that end, Lindsay Melvin says the development plan, which will be an outcome of our 2025 IRP, will account for many options and variables as it outlines the steps needed to meet future energy needs.

"The IRP focuses on the long-term energy needs of Manitoba as a whole," said Lindsay Hunter, Manager of IRP Policy & Coordination at Manitoba Hydro. "This means we're typically looking at utility-scale resources to balance Manitoba's supply and demand needs, how the electricity and natural gas systems support each other, and what we may need to invest."

Examples of the utility-scale resources being considered in the planning process include wind, hydroelectricity, natural gas, renewable natural gas, hydrogen, and energy storage.

"As we work through our planning process, it's equally important that we consider programs for reducing demand at peak times and other methods for saving energy or optimizing our energy systems – for example, dual-fuel heating (a combination of a natural gas furnace and an electric heat pump)," said Hunter.

Planning for our energy future – an ongoing process

Manitoba Hydro identified the need for investments in its 2023 IRP (https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-integrated-resource-plan.pdf) , which studied how the energy transition could impact our natural gas and electricity systems from generation to transmission to distribution.

(https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-integrated-resource-plan.pdf)

2023 Integrated Resource Plan

Download the 2023 Integrated Resource Plan (https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-integrated-resource-plan.pdf) (PDF, 12 MB)

The utility monitors the pace of energy transition, keeping tabs on the ways energy use is changing and the speed at which demand for energy will grow against our ability to supply it.

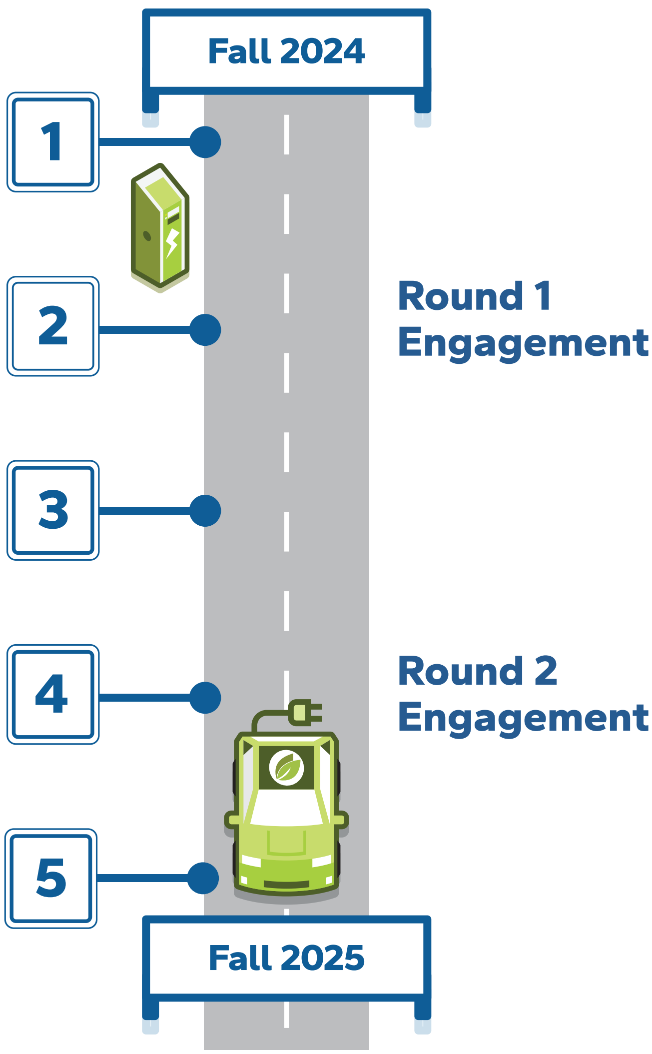
And we continue to monitor the pace of change by watching for signposts (https://www.hydro.mb.ca/docs/corporate/irp/2023-irp-signpost-update-en.pdf) like government actions, market forces, and customer decisions. Watching these signposts for any changes and understanding how they may impact our energy future helps us with energy planning, ensuring we have as much information as possible to inform our long-term plans.

Integrated Resource Planning: the steps to success

The 2025 IRP involves a number of steps (https://www.hydro.mb.ca/docs/corporate/irp/2025-irp-process-overview-en.pdf) including:

- public engagement with customers and interested parties, helping to inform our planning;
- information gathering and data analysis;
- modelling potential energy futures; and
- analyzing potential development plans.

After those steps are complete, Manitoba Hydro can determine the recommended development plan.



1. **Setting direction.**
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Our experts use specialized computer models to test how Manitoba Hydro may serve future energy needs in the various scenarios. We will compare and evaluate the modeling and analysis outputs to see and share how they align with Manitobans' energy needs.

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From the evaluation of the modeling and analysis, we'll draft a preliminary recommended development plan for meeting the needs of our customers for years to come. We will share and seek feedback on this draft plan and our proposed road map outlining what actions are needed now to prepare for the energy future.

5. **Finalize the Integrated Resource Plan.**
After reviewing feedback, we'll finalize the recommended development plan and road map, and publish the IRP in Fall 2025.

Following the release of our development plan – estimated to be completed in fall 2025 – Manitoba Hydro will start putting that plan into action.

"There's a long road ahead to completing our development plan, and after it's released, we'll have to implement it," said Lindsay Melvin. "That could potentially mean building new resources and finding new or other ways to meet Manitoba's energy needs, as well as developing and modifying further plans as we go.

"Developing an IRP is an iterative process – we'll continue to work to understand the changing energy landscape in the 2025 and all subsequent IRPs.

"It's an ongoing journey, but it's critical to ensuring we navigate the coming years successfully and continue serving Manitobans with the safe, reliable energy they expect from Manitoba Hydro."

Learn more about Integrated Resource Planning, our findings from the 2023 IRP, and how you can participate in setting a path toward a bright energy future.

You may also be interested in

WORKING FOR YOU |

What is the energy transition?

WORKING FOR YOU |

Meet our new website — a result of your feedback

WORKING FOR YOU

What is the energy transition?

This article was published in October 2024 and may be outdated.

There's lots of talk about the "energy transition" on the news, on TV and on social media. It's a hot topic in industry, government, and other forums. You may also have heard the term in relation to things like electric vehicles (EVs), renewable energy sources, decarbonization, fossil fuel alternatives, space heating, and climate change.

But let's get specific – what does "energy transition" really mean?

Energy – how it's made, how it's delivered and how it's used – is changing

According to Lindsay Hunter, manager of Manitoba Hydro's IRP Policy and Coordination department, the phrase "energy transition" covers many different topics because its implications are so broad and may influence many different aspects of our world.

"In brief, the energy transition is the shift in how energy is made, delivered and used all around the world," Lindsay said. "A large part of this transition is a shift from fossil-based energy like coal, oil, and natural gas to different energy sources like wind, solar and hydroelectricity.

A large part of the energy transition is a shift from fossil-based energy to different sources like wind.

One example of this change is the increasing number of customers shifting from buying internal combustion engine vehicles (fueled by gasoline or diesel) to vehicles powered by electricity or potentially hydrogen. Another is the growth in customers using technologies such as ground or air source heat pumps to heat their homes instead of or alongside natural gas. Even the shift to battery powered chainsaws, leaf blowers and lawn trimmers is part of this energy transition.

Utilities and energy providers need to consider this shift to more vehicles and appliances that depend on electricity — and other factors, like energy efficiency programs and technology — when they plan and invest in energy infrastructure to meet growing demand.

"And when we talk about changes to how energy is generated, we're talking about how utilities or other generators produce energy, for example using hydroelectricity or wind generation to produce electricity, using natural gas for heating, or refining petroleum products to produce gasoline," Lindsay said.

"Right now, most of Manitoba Hydro's energy is hydroelectricity – electricity generated by the flow of water. In the future, Manitoba's new energy needs could come from different sources like wind. But it isn't always windy, which means there will continue to be an important role to play for more dependable sources of energy like natural gas and hydroelectricity ensure the reliability of our energy supply. This is another part of what we mean when we talk about the change in the way energy is generated and how that relates to the energy transition."

The ways in which we deliver energy are also shifting in the energy transition.

"Currently, petroleum companies deliver gasoline to our cars, and we have utilities like Manitoba Hydro delivering electricity to our homes," Lindsay said. "But there are changes happening with the way energy is delivered. For example, rather than filling your internal combustion engine car with fuel at a gas station, owners of electric vehicles (EVs) could be charging them at home.

"There are also more customers looking for options to enhance the energy efficiency of their home or business. That change in behaviour among consumers creates challenges and requires energy suppliers like Manitoba Hydro to adapt."

Owners of electric vehicles could be charging their vehicles at home instead of filling them up at a gas station. Enlarge image.

The energy transition has begun

Some parts of the energy transition may seem futuristic, like biomethane, battery energy storage for your home or bidirectional charging to and from your electric vehicle. While these technologies have not yet been widely adopted in Manitoba, they exist today in other parts of the world – and they may make their way to Manitoba in the future.

That said, the energy transition has already begun in Manitoba in other ways. For example, many Manitobans are choosing to purchase electric vehicles (Manitoba set a record for EV sales last quarter.)

And it's not just individual consumers taking part in the energy transition. Some large commercial and industrial energy users in Manitoba are taking action to decarbonize their operations by choosing to shift their processes or heating from natural gas to electricity, helping them reach their own emission reduction targets. Others are looking at how natural gas might complement other less mature technologies like ground- or air-source heat pumps.

Some large commercial and industrial energy users are decarbonizing their operations by shifting their processes or heating from natural gas to electricity. Others are exploring how natural gas could complement other energy sources for heating. Enlarge image.

Along with changes in the type of energy customers are using, there are changes in who is producing it. Some Manitoba Hydro customers may choose to generate their own electricity through solar (or photovoltaic) panels they install on their home or business. The decision to build and use solar panels is just one of many energy-related choices with implications for Manitoba's electrical infrastructure and the energy market — implications including the potential need for greater investment in our energy system to ensure we can meet our customers' needs.

"The energy transition is already having an impact on Manitoba Hydro," Lindsay said. "We serve the whole province, and because of the energy transition, we are very likely to be taking on a larger share of total energy supply in the province.

"For example, if you look again at the shift from internal combustion engines to EVs, power for those EVs represents an entirely new demand for electricity. It's not energy Manitoba Hydro has provided before – it's brand-new energy load that we will likely need to serve in future, whether through hydropower, wind generation, or other means."

The biggest factor driving the energy transition? Decarbonization.

Climate change is one of the defining issues of our era – and individuals, utilities, governments and other organizations around the world are responding.

One way many organizations are trying to mitigate the effects of climate change is through decarbonization – reductions in the amount of greenhouse gases in the atmosphere, in part by reducing carbon emissions from energy.

"It's one of the biggest factors impacting the energy transition," Lindsay said. "Decarbonization has huge implications on decisions about energy in the future.

“Other aspects like decentralized energy infrastructure (for example, district energy systems that use recovered thermal energy to heat or cool a neighbourhood) and growth in digital technologies also affect the transition, but decarbonization is the big one.”

Decarbonization comes with challenges. For example, natural gas (a carbon-emitting fuel source) is vital to meeting demand for heating, and in a province where temperatures regularly dip below -40 C each winter, reliable heating is non-negotiable. However, other decarbonization options – like hydrogen for fuel and innovations in natural gas – are already showing promising results as our society continues to decarbonize.

And while we know for sure that the energy transition is already underway, we can only estimate the pace of change.

“It could be slow, or it could be fast – it all depends on when people start making their choices as part of the transition,” Lindsay says. “But the transition is already happening, and as a utility that supplies energy to hundreds of thousands of customers, Manitoba Hydro is making sure that we plan for this change.”

Manitoba Hydro’s Integrated Resource Plan: preparing for your energy future

(https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-integrated-resource-plan.pdf)

2023 Integrated Resource Plan

Download the 2023 Integrated Resource Plan (https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-integrated-resource-plan.pdf) (PDF, 12 MB)

Through Integrated Resource Planning, Manitoba Hydro is working to understand our province's future energy needs and what steps may be necessary to manage the change and ensure we can continue delivering safe, reliable energy, now and into the future.

"We're preparing for the energy transition, and we're focused on Manitoba," Lindsay said. "Whether it's planning for our future decisions about necessary investments or managing the potential for impacts on our customers, our Integrated Resource Plan is a repeatable process we regularly update to help us keep on top of and respond to changes occurring in the energy landscape. It's a tool to help us make sure we make the right decisions at the right time so we can lean into the energy transition prepared and ready to serve our customers."

Manitoba Hydro is hard at work on a new Integrated Resource Plan (IRP) expected to be completed in the fall of 2025.

Curious about the energy transition, the factors influencing our energy future or Manitoba Hydro's IRP? **Learn more about our Integrated Resource Plan**.

You may also be interested in

WORKING FOR YOU |

Survey to inform 2025 IRP now live: share your thoughts about our energy future

WORKING FOR YOU |

Meet our new website — a result of your feedback

WORKING FOR YOU |

Pole fires: a leading cause of springtime outages

1.4. General Public Round 1 Survey Report

2025 Integrated Resource Plan Customer Survey Report – Round 1

Feedback collected November 5 - December 19, 2024

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Table of Contents

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Key Findings

Energy Planning Factors Importance

Respondents most likely to rate reliability as important.

- Minimizing the frequency and length of outages ranks the highest with 95% of respondents indicating it is very or somewhat important.
- Many respondents mention reliable energy as a basic expectation of Manitoba Hydro.

Protecting the environment and minimizing rate impacts are also considered important.

- Protecting the environment was rated as very or somewhat important by 91% of respondents.
- Minimizing rate impacts was rated as very or somewhat important by 90% of respondents.

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Energy Planning Factor Prioritization

Overall, environmental factors and rate impacts are prioritized.

- Survey respondents indicated the priority order should be protecting the environment, impacts to rates and reducing greenhouse gas emissions.
- Engagement was primarily with highly energy–engaged respondents and likely overstates the typical Manitobans prioritization of environmental factors.

Different groups show unique priority preferences of energy planning factors.

- Rural respondents are more likely to prioritize minimizing rate impacts and maintaining reliability, and less likely to prioritize environmental factors.
- Indigenous respondents are more likely to prioritize promoting economic development and protecting the environment than non-Indigenous respondents.

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Customer Energy Decisions

Respondents are beginning to adopt and consider technologies that will impact future energy planning.

- Purchasing an EV and adding solar panels to homes are the top two energy related decisions that respondents are considering over the next 2-10 years.
- Smart home energy devices are the most common technology already in use with respondents.

Respondents are slow to report consideration for transitioning energy sources for home space heating.

- Switching from natural gas to electric space heating is the energy decision respondents are least likely to consider.
- Switching space heating to a ground or air source heat pump is being considered by about a quarter of respondents over the next 2-10 years.

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Trust In Energy Planning

Respondents report key themes of reliability, affordability and engagement build trust in energy planning.

- Respondents indicate that communication about future plans and providing engagement opportunities demonstrates that Manitoba Hydro values feedback.
- The perception of affordable rates and customer incentives for energy related upgrades are viewed by respondents as trust builders.
- Respondents mention experiencing consistently reliable energy as a common reason for having trust in our energy planning.

Respondents want to know about investments and view public ownership as a trust building feature.

- Seeing investments in infrastructure, especially in renewable energy sources builds trust that we are taking a forward-thinking approach to energy planning.
- Respondents want to know what we are doing to protect the environment when we launch new infrastructure investments and report this communication builds trust.
- Being a Crown corporation, we are seen as more accountable to the public.

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Engagement Overview

Engagement Overview

The survey was open for feedback from November 5 to December 19, 2024. In total, close to 6,800 survey responses were received.

The survey was promoted to residential customers, the IRP subscriber list, employees, First Nations customers and leaders. A range of communication tools were used including:

- Direct email invitations
- Bill inserts
- Organic and paid social media
- Internal Manitoba Hydro communications
- Manitoba Hydro website
- Event postcards

The survey was also available to complete through the public Manitoba Hydro website to provide an accessible means of engagement for a wide audience. Due to this, some survey responses may have been submitted from non-customers.

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Research Objectives

- Understand what matters most to Manitobans as we balance considerations in our future planning.
- Gain insight into perspectives on energy related decisions, interests, and needs.
- Uncover the current state of attitudes towards energy planning among Manitobans.
- Understand how we can build trust and foster community buy-in to new technologies and energy planning initiatives.

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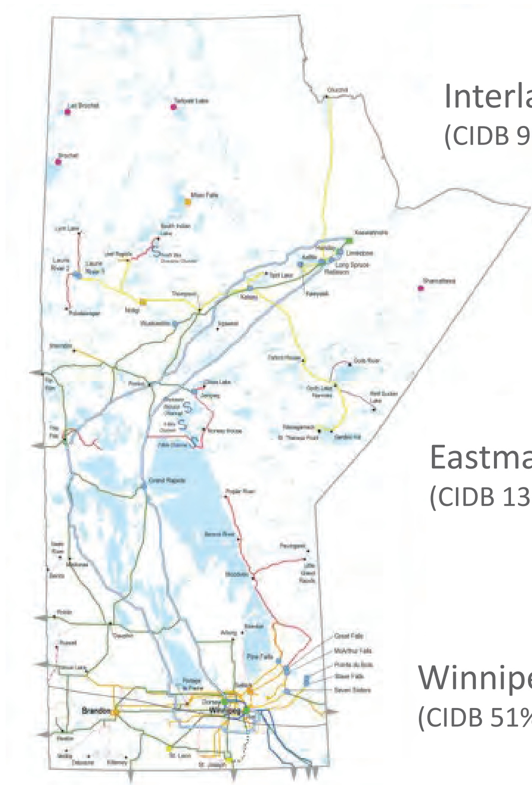
Regional Representation Of Survey Responses



Interlake North 7%
(CIDB 9%)

Parkland West 5%
(CIDB 6%)

Eastman 14%
(CIDB 13%)

South Central 13%
(CIDB 18%)

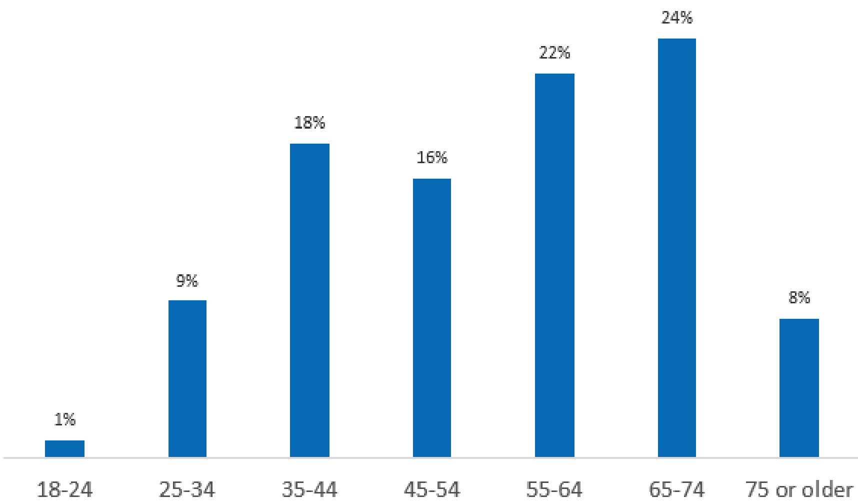
Winnipeg 62%
(CIDB 51%)

Customer Information Database (CIDB) represents the actual regional distribution of Manitoba Hydro customers.

This is being compared to the regional distribution of survey respondents from respondents that provided their postal code in their survey responses.

What Key Groups Did We Hear From?

What age category do you fall into?
Number of respondents, n = 4028



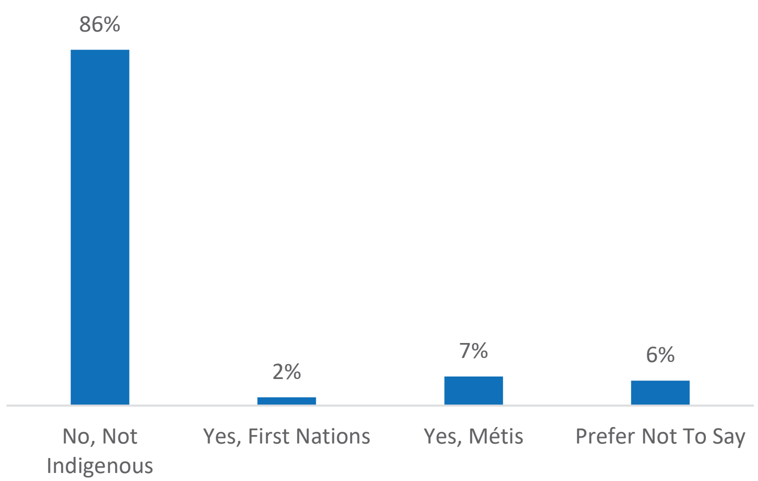
IRP Subscribers
517 respondents

Current Employees
360 respondents

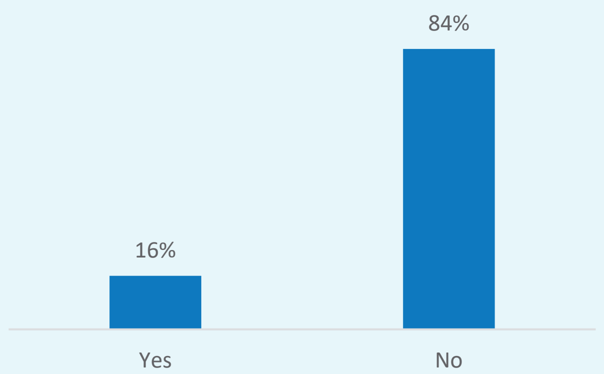
Past Employees
211 respondents

Indigenous Outreach

In total, we heard from 331 respondents identifying as Indigenous, 9% of survey responses. n = 4028

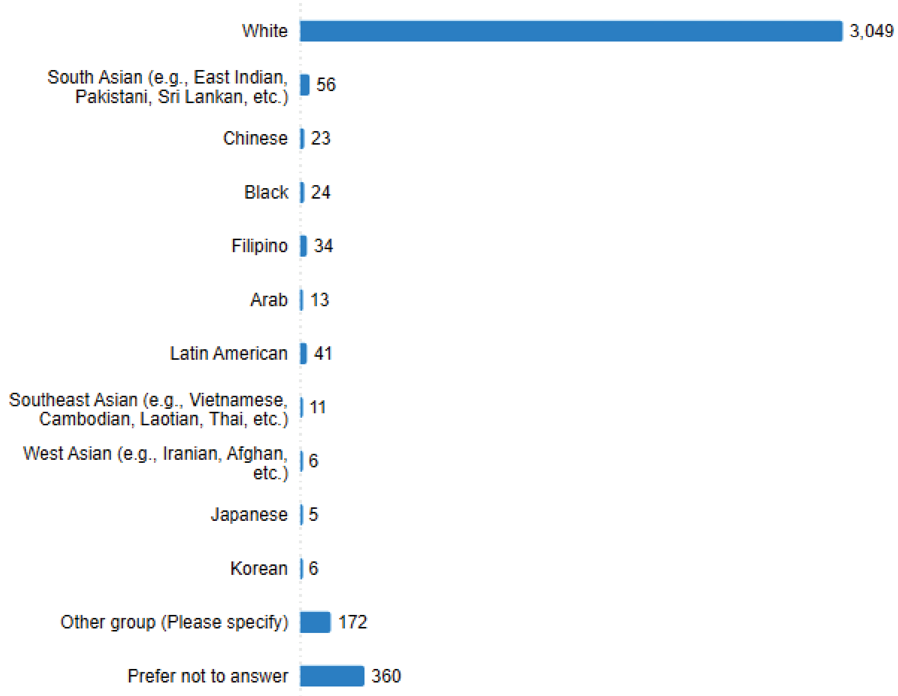


10 respondents or 16% of First Nations respondents report living on a First Nations reserve. n = 62



Visible Minority Identity

Are you: (please select all that apply) n = 3697



Respondents specified the following key groups in the "other group" response option:

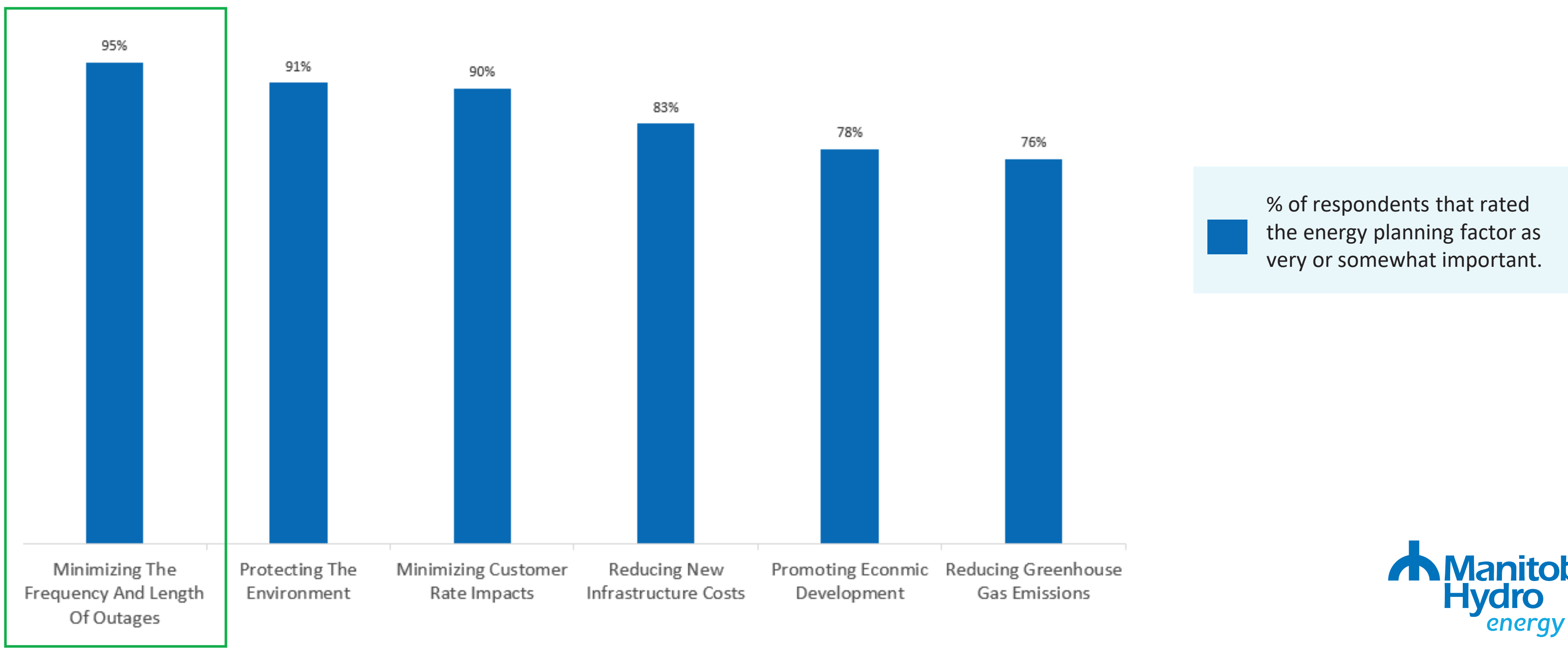
- Canadian
- Mixed
- European

Energy Planning Factors - Importance

Survey respondents were presented with six energy planning factors and asked to rate them on the importance for Manitoba Hydro to consider in future energy planning.

Respondents most likely to rate reliability as important

Many factors will be considered as we evaluate future energy options in Manitoba. How important do you think each of the factors below is for Manitoba Hydro to consider? n = 6799



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Other Energy Factors

Respondents were asked what other energy factors Manitoba Hydro should consider. Responses highlighted the following themes:

- Utility scale renewable energy infrastructure investments.
- Incentives for energy conservation and to support residential upgrades related to energy transition.
- Support for infrastructure and programs that encourage customers to produce their own energy.
- Ensuring exports are used in a way that benefits Manitobans.

"I want to see renewable energy become a major source of power. I want MB Hydro to buy back excess power at a fair rate and implement time of day meters. We need to conserve energy to reduce the need for new generation."
– Survey Response Quote

"Providing incentives greater than the ones available now to encourage people to invest in solar energy or heat pump technologies."
– Survey Response Quote

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Regional Differences

Urban Respondents	More likely to view reducing greenhouse gas emission and protecting the environment as important.
	Less likely than rural respondents to view reducing new infrastructure costs and minimizing rate impacts as important.
Rural Respondents	More likely among all rural regions to view reducing new infrastructure costs and minimizing rate impacts as important.
	More likely to view economic development as important especially in the Interlake North and Parkland West regions.
	Less likely to view reducing greenhouse gas emissions as important, especially in the South-Central region .

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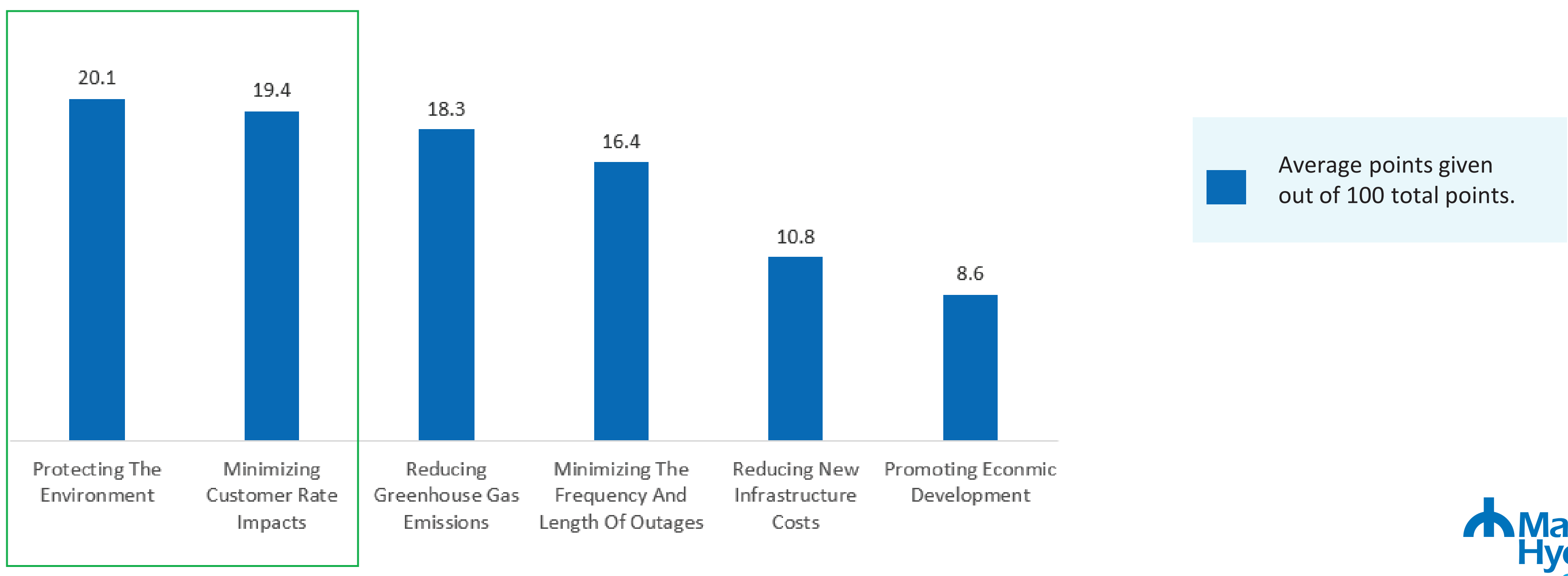
Energy Planning Factors - Prioritization

Survey respondents completed a prioritization exercise by assigning 100 points across six energy planning factors. They were instructed to assign more important energy planning factors more points, without going over 100.

Protecting the environment and minimizing rate impacts are priorities

Manitoba Hydro will have to make choices and prioritize factors as we plan for our future energy options.
Help us understand how you think Manitoba Hydro should prioritize the same factors you just rated. n = 5984



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Prioritization Reasons

Survey respondents were asked what factors they considered in their prioritization. Responses highlighted the following themes:

- Many respondents mentioned that they perceive affordable rates and reliable service as expectations of Manitoba Hydro.
- The importance of protecting the environment for future generations was frequently mentioned as a reason for prioritizing the environment and GHG reductions.
- The idea that minimizing infrastructure costs would translate to reduced costs for customers was a reason for prioritizing infrastructure costs.

"Building up MB Hydro is an investment I expect will pay returns, so I am less concerned about the cost over time. Maintaining one of the lowest emitting grids in the world should be a priority for environmental and economic reasons."
– Survey Response Quote

"I looked at it from the customers perspective to have electricity available. That is the basic need from Hydro."
– Survey Response Quote

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Regional Differences

Urban Respondents

- Respondents living in Winnipeg are more likely to prioritize environmental factors like protecting the environment and reducing greenhouse gas emissions.
- Respondents living in Winnipeg report that minimizing the frequency and length of outages is less of a priority than respondents living outside of Winnipeg.

Rural Respondents

- Rural respondents are more likely to prioritize minimizing customer rate impacts and reliability and less likely to prioritize protecting the environment.
- Rural respondents are more likely to be concerned about infrastructure costs and see minimizing these costs as a priority.
- Rural respondents are less likely to see reducing greenhouse gas emissions as a priority.

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Energy Decisions

We asked respondents for feedback on their plans for future energy related changes. The energy related decisions made now and into the future impact how we plan to meet Manitobans' energy needs.

Energy Decisions

Are you considering making any of the following energy related changes? n = 5819

% of respondents that report they have already adopted this energy decision.

Smart Home Devices 25%

Electric Space Heating 18%

Heat Pumps 9%

Electric Vehicle Charging 8%

Electric Vehicle 7%

Solar Panels 3%

Home Battery Storage 2%

Energy Decisions

Are you considering making any of the following energy related changes? n = 5819

% of respondents that are considering this energy decision in the next 2-10 years.

Purchasing Electric Vehicle
41%

Solar Panels
40%

Electric Vehicle Charging
35%

Smart Home Devices
32%

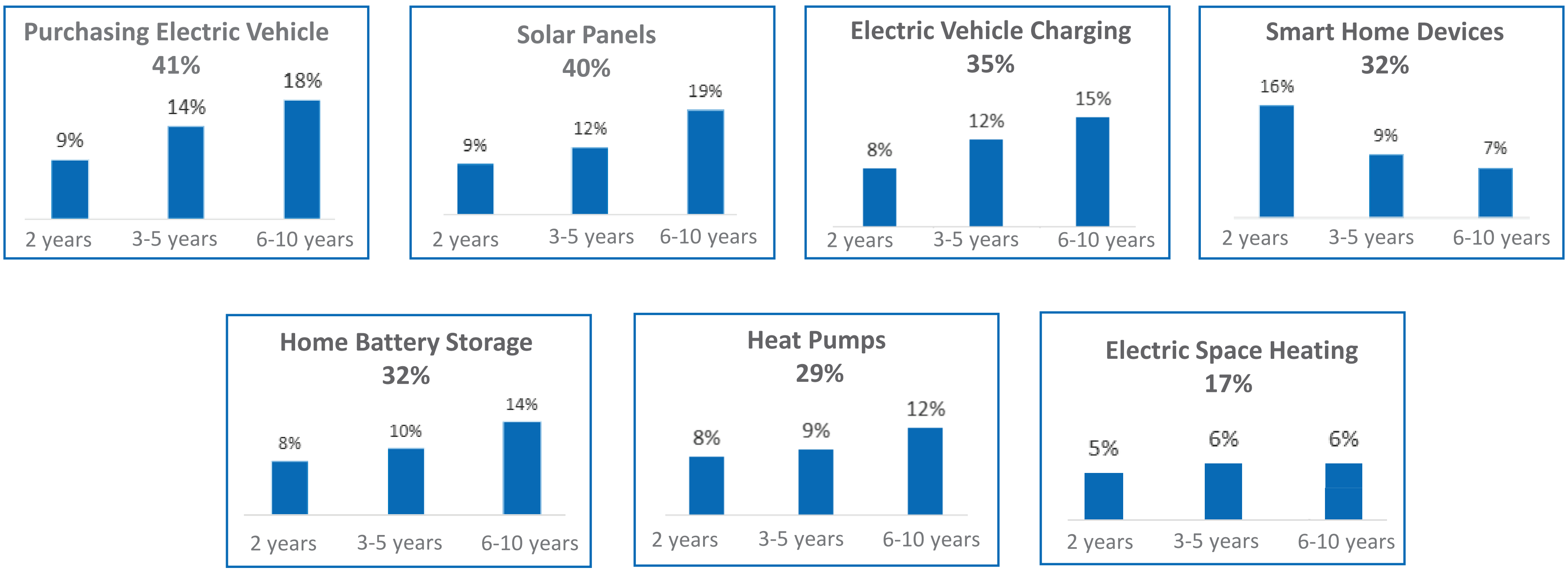
Home Battery Storage
32%

Heat Pumps
29%

Electric Space Heating
17%

Customer Energy Decisions

Energy decisions are most likely to be considered 6-10 years in the future.

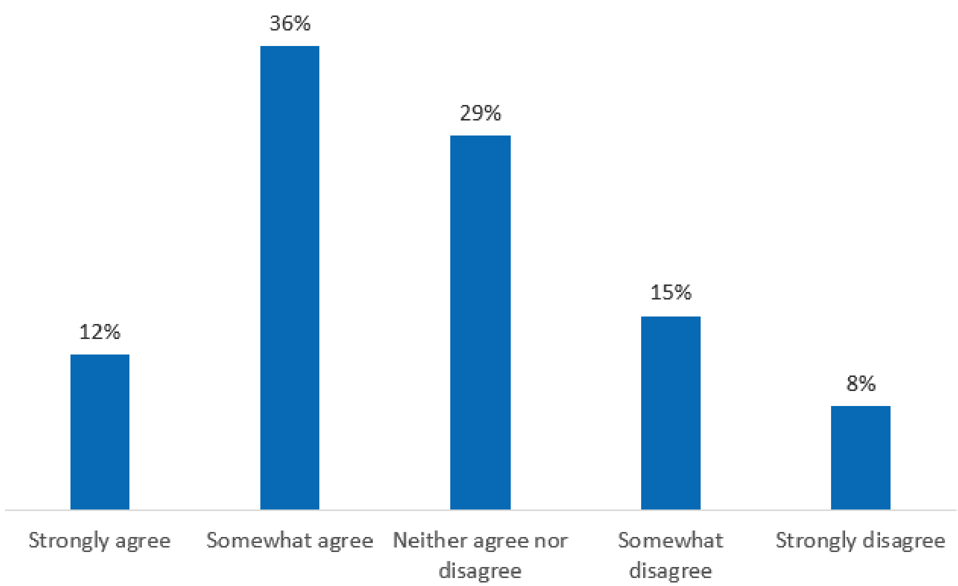


Trust In Energy Planning

Survey respondents were asked if they thought Manitoba Hydro had their best interests at heart in relation to future energy planning.

Trust in Energy Planning

Taking into account everything you know about the energy transition and your current perceptions of Manitoba Hydro; do you agree or disagree that Manitoba Hydro has your best interests at heart as it relates to future energy planning?
n = 5788



Nearly half of respondents (48%) report they somewhat or strongly agree that Manitoba Hydro has their best interests at heart.

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What experiences make you feel this way?
Trust Building Themes

Public Ownership: There is a perception that public ownership builds trust.

Reliability: Survey respondents value the reliable energy they receive from Manitoba Hydro and mention experiences with quick response times to outages contributing to their trust in us.

Affordability: Survey respondents view affordable rates as a reason they trust we have their best interests at heart. Many respondents mentioned support to help reduce energy related costs and incentives to upgrade to renewable energy in their homes as ways to build trust.

Communications and Engagement: Survey respondents report that communication about future plans and opportunities for public engagement demonstrates that Manitoba Hydro values feedback.

Future Planning: Survey respondents like seeing investments in infrastructure, specifically in renewable energy sources. This builds trust that we are taking a forward-thinking approach to energy planning.

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Trust Building Experiences

"I feel lucky to have relatively inexpensive energy rates. My power is very reliable. If there has ever been a disruption it is generally managed quickly and well."
– Survey Response Quote

"Manitoba Hydro employees live & work here, with families of their own so I assume they have a vested interest in having Manitobans' best interests at heart." – Survey Response Quote

"These consultations and surveys to get public opinion. The fact that electricity prices have been quite stable for a long while."
– Survey Response Quote

"I have been seeing many more ads about how we can save energy costs and helping financially is very good sign that they're working hard at getting the word out and adding incentives to do so."
– Survey Response Quote

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What experiences make you feel this way?
Lack of Trust Themes

Reliability: Personal experiences with outages and the perception that future increased demand will overwhelm the grid leads to a lack of trust in our energy planning.

Affordability: Survey respondents mention increasing rates and financial mismanagement including operating with high debt levels as a reason they lack trust.

Environmental Concerns: Survey respondents are concerned about the environmental impact of existing and future infrastructure in our province.

Infrastructure Investments: Survey respondents make mention of past infrastructure projects that led to a lack of trust in our infrastructure planning and financial management. They also express concern that Manitoba Hydro is not investing enough in upgrading our grid and pursuing additional generation through new renewable sources.

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Experiences Leading To Lack Of Trust

"Still putting too much focus on short term and combustions sources, not enough distributed generation being built, not upgrading the grid."
– Survey Response Quote

"Every plan that does not make the grid more reliable or cheaper does not have the public's interest at heart." – Survey Response Quote

"Hydro cannot meet the needs now. Too many interruptions to be totally reliable."
– Survey Response Quote

"Approval of projects are approved on the basis of what is in the best interest of the political party in power, not the environment or consumer."
– Survey Response Quote

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Additional Comments

Additional Comments

What else should we know about your questions and comments related to future energy planning?

- Respondents view providing reliable energy at affordable rates to be key in future energy planning.
- Respondents are interested in transitioning to renewable energy sources and are looking to Manitoba Hydro for support and information.
- Respondents want to know plans for future utility scale renewable energy generation and projections on how Manitoba Hydro will meet future demand.
- Respondents express concerns about ensuring future energy generation considers the environmental impacts on the province.

"I believe that future energy planning in Manitoba should prioritize affordability, reliability, and transparency for customers. With rising energy costs impacting household budgets, it's essential that Manitoba Hydro takes measures to keep rates as low as possible."
– Survey Response Quote

"There is so much possibility in renewable energy generation, I'm really excited to see where we can go. Dream big, be a leader."
– Survey Response Quote

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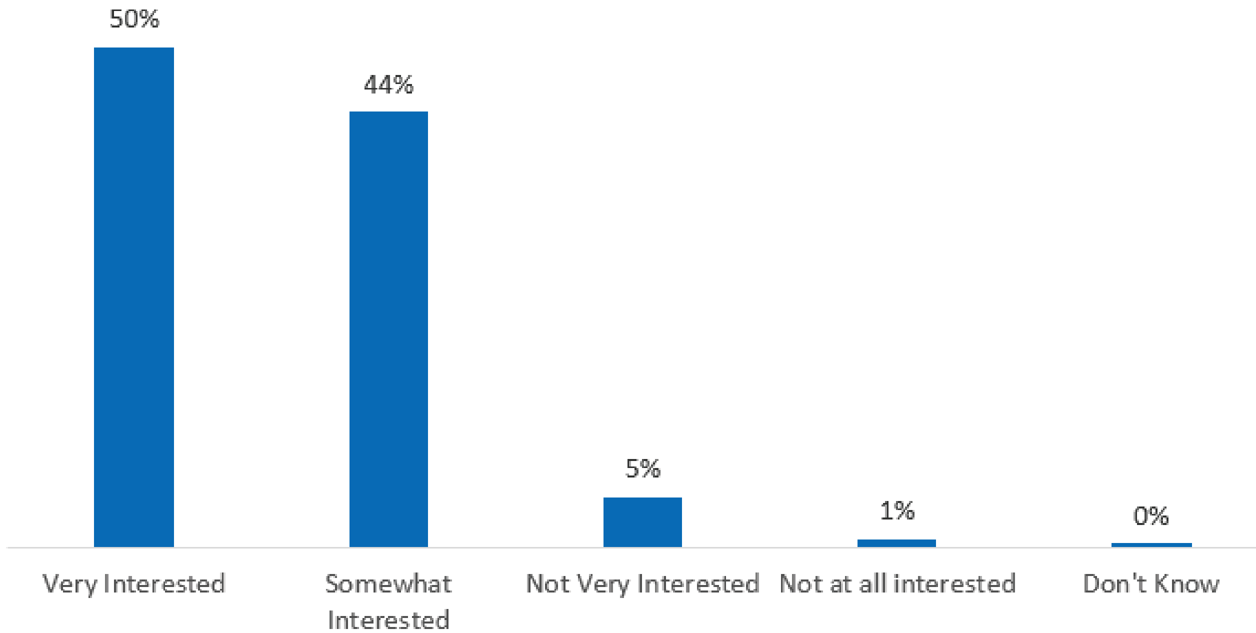
Energy Attitudes

Respondents are more likely to be interested in technology

How interested are you in new technology? n = 4025



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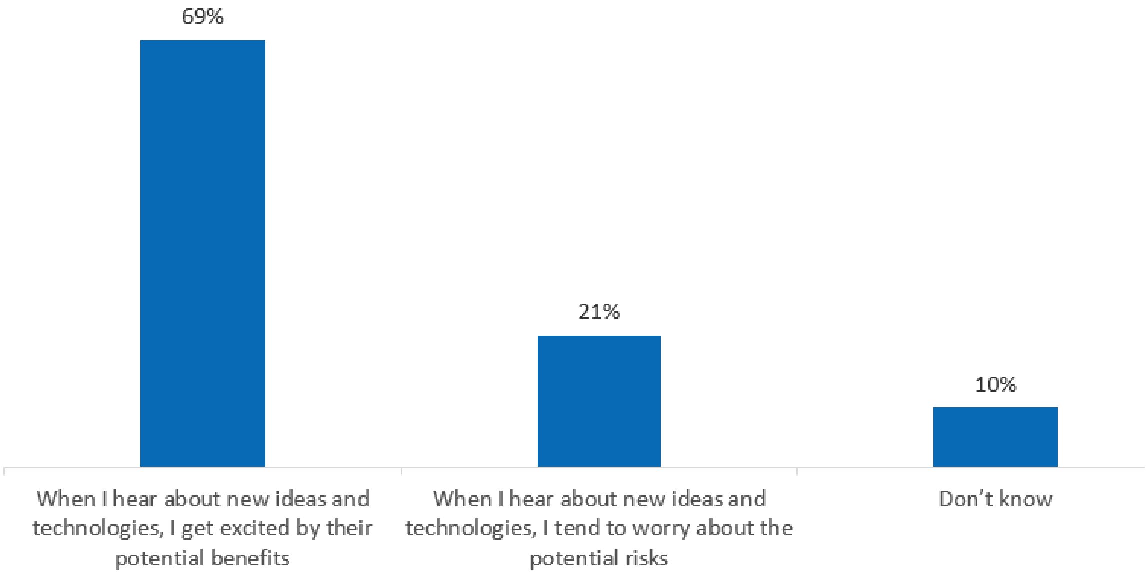
Respondents are more likely to be excited by new ideas and technologies

Which of the following statements comes closest to your view? n = 4025



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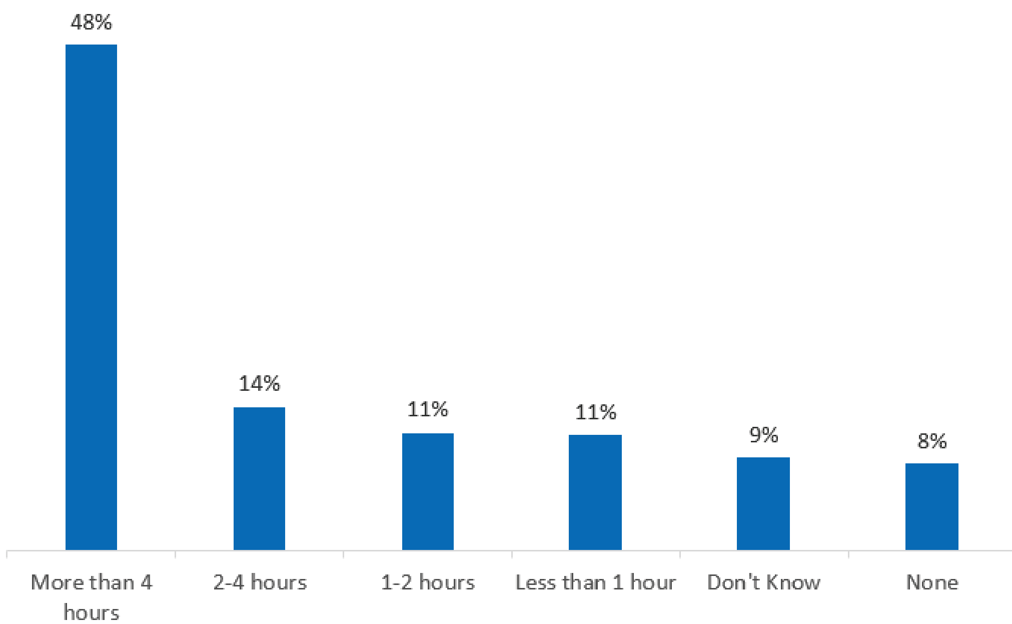
Respondents are most likely to spend more than 4 hours a year researching energy products or actions

In the past year, how much time have you spent researching energy products or actions to reduce your environmental impact? n = 4025



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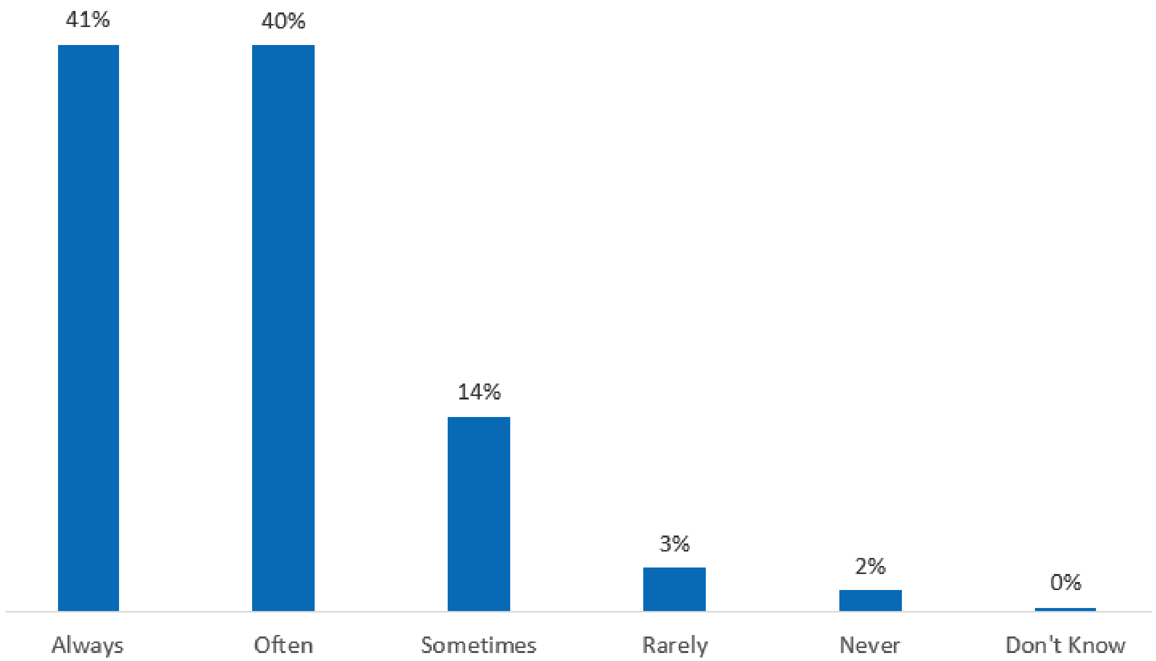
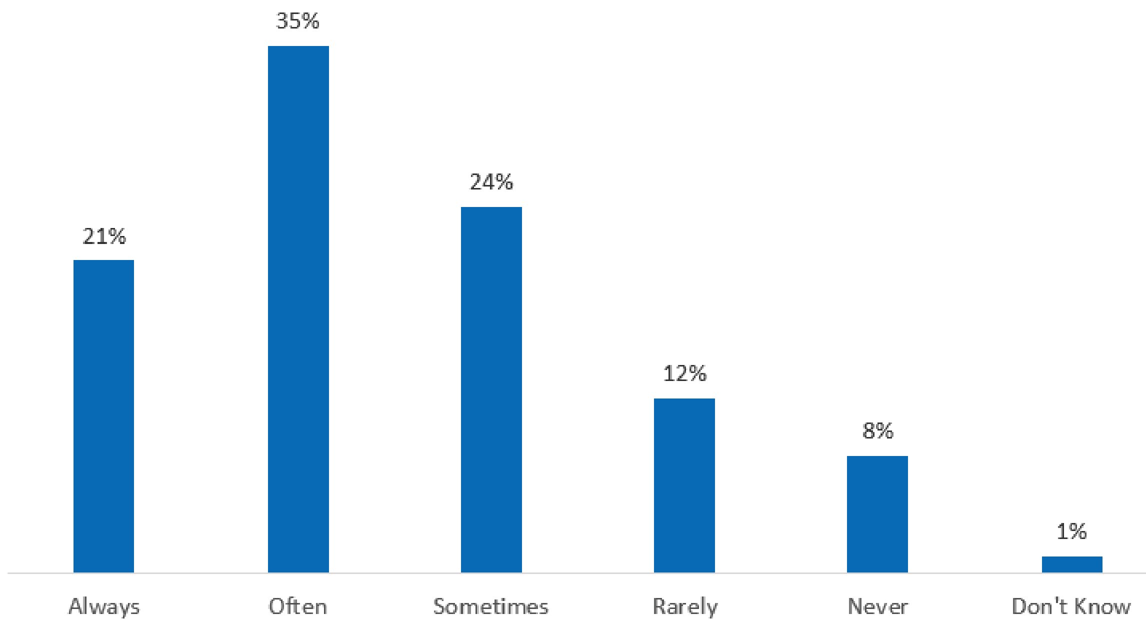
81% of respondents always or often take everyday actions to reduce energy usage

How often do you take action to reduce everyday energy usage? E.g. washing laundry in cold water, hanging laundry to dry, cooking or reheating food using a microwave, turning down heating/air conditioning/water heater etc. n = 4013



56% of respondents always or often monitor their energy use

How often do you monitor your energy use and adjust devices or appliances to reduce it? n = 4013



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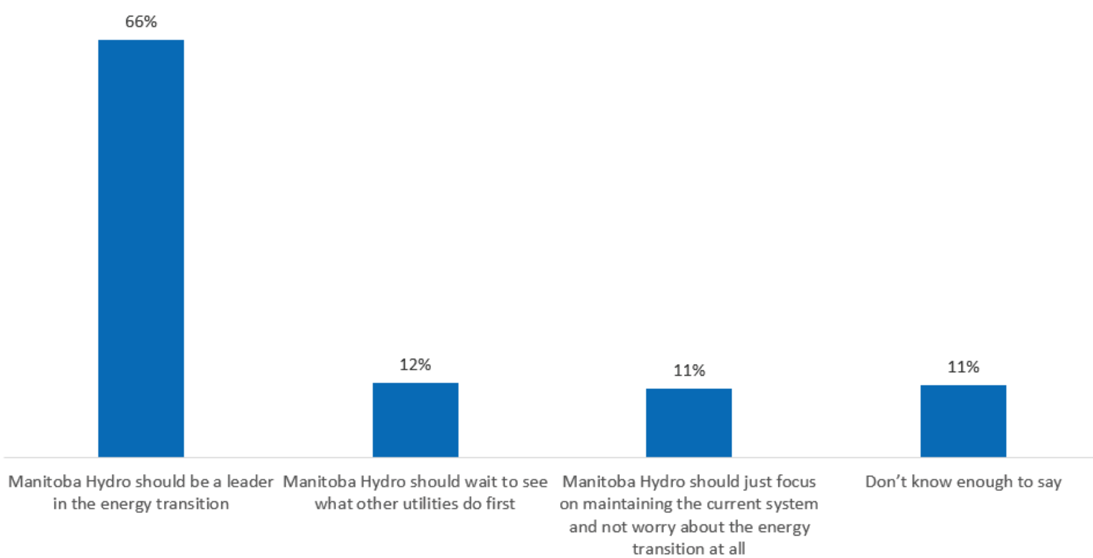
Respondents are most likely to say Manitoba Hydro should be a leader in the energy transition

When it comes to the energy transition, some customers are saying they expect their energy utilities to take the lead by investing rapidly in new infrastructure and encouraging new energy choices while others would prefer a wait-and-see approach, holding off on major investments until more information is available.

Which statement below best describes the approach you believe Manitoba Hydro should take when it comes to the energy transition? n = 4004



Prepared By: Customer Insights and Business Performance Department in collaboration with Integrated Resource Plan Policy and Coordination Department

1.5. General Public Round 2 Survey Questions

The future flows from here

We're planning for the province's future energy needs through our 2025 Integrated Resource Plan (IRP). An IRP is a long-term planning process that helps us determine how to meet Manitoba's electricity and natural gas needs in a safe, reliable and affordable way.

We've developed a road map that outlines the approximate quantities and timing of new resource options needed to meet future energy needs—such as energy efficiency, wind, enhancements to existing hydro generation, battery storage and combustion turbines. Now, we want to hear from you.

Take our quick two-minute survey to share your thoughts. All the information you need is included in the survey.

Introduction

Manitoba Hydro is hard at work planning and preparing for the future by creating the 2025 Integrated Resource Plan (IRP).

The 2025 IRP includes a road map that outlines the steps we'll need to take in the next ten years to help ensure we're ready for the energy future.

We are now ready to share the road map and want to hear from you!

Input from our customers, interested parties, and the broader energy planning community all helped to inform the development of 2025 IRP road map. Feedback from this survey will inform ongoing planning and implementation of the 2025 IRP road map to provide the safe and reliable energy you count on.

We will also use your feedback to inform upcoming marketing and communications activities to help Manitobans learn more about our energy future. Your personal information will not be used or publicized.

If you have any questions or concerns about this survey, contact us. If you have questions about your service from Manitoba Hydro, please visit our Contact Us page.

Survey Questions

1. If you haven't already, please take a few minutes to review the 2025 IRP road map.
   Do you have any questions or feedback on any of the road map components? (open-text)

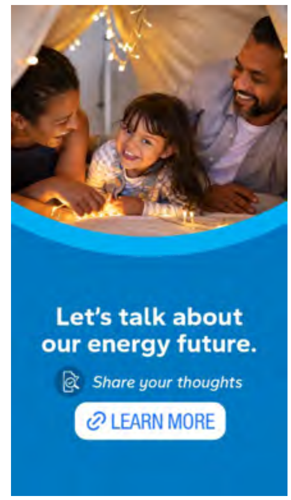
2. What parts of the 2025 IRP road map are you interested in learning more about? Select all that apply
    a. Resources included in the recommended development plan
    b. Resources not included in the recommended development plan
    c. Near-term actions (what we will do in the next five years)
    d. Learnings (key insights gained from the IRP process)
    e. Signposts (the things we monitor to see if our plans need to change)
    f. I am not interested in learning more
    g. Other, please describe

3. Please provide your email address if you would like to receive information on energy planning updates and future engagement opportunities. (Open-text)

4. Do you have any other questions or comments about Manitoba Hydro's energy planning? (Open-text)

1.6. General Public Round 2 Survey Promotional Materials Distribution

The Round 2 public survey was shared and open to the public for response between December 11, 2025, and December 23, 2025. While the survey was open, it was widely promoted across the province, with an invitation to participate through a range of communication tools and in both English and French, using both direct and indirect methods.



- **Email outreach:** Direct email invitations to participate in the customer survey were distributed to approximately 316,000 online billing customers. A direct email promoting participation in the survey was also sent to approximately 8,000 existing IRP subscribers.
- **Project website updates:** The project website was updated and included a link to the survey.
- **Social media campaign:** Organic and paid social media was used to encourage Manitobans to take the survey and visit the project website to learn more. The campaign took place on Instagram, Facebook and Linked In and resulted in approximately 10,600 clicks.
- **Digital Display Campaign:** Banner advertising was used to reach rural, urban, and First Nations customers which resulted in 4,215 clicks.
- **News Release:** A News Release was posted on the News & Stories section of the Manitoba Hydro Website on December 11, 2025.
- **Radio Ads:** A 30 second radio ad aired three times per day, every day over December 10 to 19, 2025, with the goal of reaching First Nations, French, and rural residents. The ads aired on 25 stations.

1.7. General Public Round 2 Promotional Materials and Information Handouts

This section includes the following materials:

- Postcard
- Information Handout: *Draft Road Map*
- News Release: Manitoba Hydro shares 2025 Integrated Resource Plan road map

2025 Integrated Resource Plan: Draft Road Map

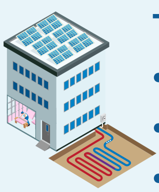
How we're preparing for the energy future

Our draft recommended development plan

By 2035...	**1760 MW** added capacity	**$3.4B** capital invested

- ✓ Complies with federal clean electricity regulations
- ✓ Meets net-zero grid requirements
- ✓ Enables a pathway to a net-zero economy by 2050

Resources in the draft plan (accredited capacity)

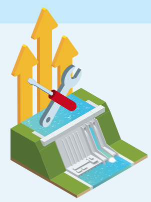


Total customer side solutions: 860 MW

- Energy efficiency base plan: 450 MW
- Additional efficiency programs: 100 MW
- Demand response and curtailable rate programs: 310 MW

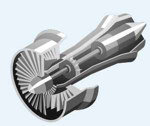
Wind: 120 MW*

*120 MW accredited capacity is equivalent to 600 MW installed capacity.



Upgrades to existing hydropower: 25 MW

Short-term, utility-scale battery storage: 5 MW



Combustion turbines fuelled by natural gas/biomethane: 750 MW

Reliability: Supports load growth potential.

Cost: Among the lowest cost plans that meet energy needs.

Environmental: Similar impacts to other plans analyzed in the IRP.

Socio-economic: Provides greater socio-economic benefits compared to the lowest cost option.

hydro.mb.ca/future

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro *energy for life*

2025 Integrated Resource Plan: Draft Road Map

How we're preparing for the energy future

Draft learnings

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 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 2029/30 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.

Proposed near-term actions (NTAs)

To be completed in the next five years, near-term actions are grouped into themes:

Implement the development plan by planning for specific projects and connecting new resources.

Prepare for the next IRP and continue ongoing planning.

Draft signposts

Three signposts can indicate significant changes in the energy landscape. Watching these signs helps us prepare for the future.

Government actions

Customer decisions

Technologies & markets

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NEWS RELEASE

Manitoba Hydro shares 2025 Integrated Resource Plan road map

Manitobans invited to share perspectives

Manitoba Hydro has released its 2025 Integrated Resource Plan (IRP) Road Map, which includes a 10-year development plan that recommends new resources to help meet growing demand for electricity and support Manitoba's pathway to net-zero.

The IRP Road Map is the result of extensive modelling and analysis based on a set of global best practices, including the use of industry leading software. It was prepared by a team of more than 130 internal and external experts and incorporates significant input and feedback gathered during engagement with thousands of Manitobans in accordance with industry standards.

This recommended development plan identifies a mix of new energy resources and investments designed to ensure reliable, affordable energy for Manitobans in the years ahead. A key feature is significant new demand-side and energy efficiency initiatives, as well as recommended quantities of new and enhanced generation resources.

"This recommended development plan reflects the best available information and analysis of how Manitoba Hydro can meet growing energy demand while managing risk and continuing to provide Energy for Life," said Allan Danroth, President & CEO of Manitoba Hydro. "This plan will help support net-zero goals and boost the provincial economy, including providing opportunities for economic reconciliation. It represents our recommended path forward for Manitoba Hydro as we continue to provide the safe, reliable and affordable energy Manitobans depend on every day."

With energy use continuing to increase in Manitoba, the need to plan now to meet future demand is more important than ever.

Key elements of the 2025 IRP Road Map include:

- A recommended 10-year development plan, learnings, near-term actions, and signposts to help Manitoba Hydro navigate the energy transition.
- A balanced approach to development that prioritizes customer-side solutions like Efficiency Manitoba programs, demand response, and curtailable rates programs.
- An explanation of the six resource options feasible to develop in Manitoba over the next decade, including Indigenous majority-owned wind generation, battery storage, enhanced hydro generation, and combustion turbines fueled by natural gas (with the ability to integrate renewable fuels as they become more readily available).
- Strategic investments in transmission, distribution, and natural gas infrastructure to enhance system reliability, address major obsolescence concerns with our existing assets and enable the integration of new resources.

Manitoba Hydro is inviting Manitobans to review the IRP Road Map and share their perspectives before it is published in January as part of the 2025 IRP report.

To participate, Manitobans are encouraged to review the IRP Road Map and complete a short survey.

For more information, please contact:

Scott Powell, Director, Corporate Communications & Marketing
204-299-8849
spowell@hydro.mb.ca

1.8. General Public Round 2 Survey Report

The Round 2 General Public Survey Report will be provided in supplemental reporting.

2. Interested Parties (IP)

Interested parties are any individual or group with a representative voice and demonstrated interest in participating in the development of the 2025 IRP. Interested Parties represented a variety of perspectives and organizations including:

- Academia
- Associations – Sector and Community
- Economic Development Organizations
- Efficiency Manitoba
- Indigenous Organizations, Communities and Governments
- Manitoba Hydro Commercial and Industrial Customers
- Non-governmental Organizations – Social and Environmental
- Municipalities

Approximately 85 groups were identified and invited to participate in the Interested Parties engagement. Additional participants that expressed an interest in participating were added throughout the process.

The following information is provided about engagement with Interested Parties in the subsequent sub-sections:

- 2.1. Engagement Process Summary
- 2.2. Pre-Engagement Survey Questions
- 2.3. Pre-Engagement Survey Summary
- 2.4. Round 1 Presentation and Handouts
- 2.5. Round 1 Participation Summary
- 2.6. Round 1 What We Heard Summary
- 2.7. Round 1 Questions and Answers Summary
- 2.8. Mid-Project Information Session Presentation and Handouts
- 2.9. Mid-Project Information Session Participation Summary
- 2.10. Mid-Project Information Session Questions and Answers Summary
- 2.11. Round 2 Presentation and Handouts
- 2.12. Round 2 Participation Summary
- 2.13. Round 2 Questions and Answers Summary

2.1. IP Engagement Process Summary

Sharing technical details while keeping the information accessible was a goal when creating engagement content. Because the content and materials required explanation and further discussion, workshops were the chosen method for engagement.

Three unique virtual workshop sessions were held: Round 1, a Mid-Project Information Session, and Round 2. Interested party workshop sessions focused on receiving feedback on the draft key inputs, scenarios, and evaluation metrics, sharing progress on the IRP, and presenting the IRP Road Map. Representatives from Efficiency Manitoba and the Government of Manitoba attended as observers to listen to the session and discussion. Daymark, an independent expert consultant to the PUB, attended the Mid-Project Information Session and Round 2 Interested Party workshops.

Urban Systems Ltd., an external engagement consultant, supported workshop design, session facilitation, and summarizing feedback and session outcomes.

Identifying and Inviting Interested Parties

When identifying Interested Parties, the goal was to provide inclusive opportunities to participate, recognize geographical constraints, and engage with different types of knowledge and interests.

The list of Interested Parties from the 2023 IRP was used as a starting point. Some of the previously identified Interested Parties were invited to be members of the newly formed Technical Advisory Committee, while the others were identified as Interested Parties for the forthcoming 2025 IRP.

Actions were then taken to identify and inform new Interested Parties, including:

1. Organizations, including the Association of Manitoba Municipalities, Engineers Geoscientists Manitoba, and the Association of Consulting Companies - Canada, informed membership of Interested Party sessions through newsletters.
2. Existing Manitoba Hydro relationships were leveraged to send invites, including to large customers.
3. When applicable, Energy Planning Workshops with Indigenous Nations shared information about forthcoming Interested Party sessions.
4. Presentations at professional conferences, including the Manitoba Professional Planners Institute, provided information about how to sign up for Interested Parties sessions.

There were instances when parties who reached out to the IRP team through cold calls were provided the information they requested and were also informed of Interested Parties sessions if they were occurring. Word of mouth further spread information about Interest Parties sessions in an informal manner.

Round 1

The Round 1 Interested Parties presentation shared the scope and development process for the 2025 IRP and informed participants about the focus on preparing a recommendation on a 10-year development plan. The session included an overview of how the signposts and 2023 IRP informed the development of the draft key inputs and proposed scenarios, resource options strategies, and evaluation metrics.

It was emphasized that the main purpose of the session was to understand what matters to participants as Manitoba Hydro plans for Manitoba's energy future. It was also emphasized that the session would focus on sharing and seeking feedback about the key inputs, scenarios, and evaluation metrics that would be used in IRP analysis. The workshop involved a detailed presentation divided into four main sections:

1. Introduction
2. Share and seek feedback on the 2025 IRP key inputs and scenarios
3. Share and seek feedback on the 2025 IRP evaluation metrics
4. Next steps

Each workshop session involved a similar approach and lasted 1.5 hours. Potential participants were invited directly by email and asked to register for sessions through a link provided in the email to join the virtual MS Teams webinar. The session began with a land acknowledgement, and was followed by a brief introduction, the agenda for the session, and some housekeeping.

There were defined opportunities throughout the sessions for participants to ask questions and discuss the materials. Participants were asked to provide feedback through several Mentimeter polls, the Q&A, chat, or by using the "raise your hand" function of the virtual meeting platform. A copy of the presentation and post-session feedback survey was shared with attendees following the session. IPs could also communicate through the general IRP email.

Mid-Project Information Session

The Mid-Project Information Session for Interested Parties was added as an interim check in and highlighted key observations from the development process as Manitoba Hydro considers options to meet Manitoba's growing energy needs over the next decade. It focused on sharing two things: 1) Six feasible resource options available that can be developed in the next ten years to meet demand (the development plan timeframe), and 2) the narrower load projection range that was focused on when creating a development plan.

The main purpose of the session was to share information and answer any questions participants may have. The presentation was divided into four main sections:

1. Introduction
2. Updates since Round 1 Engagement
3. Two key findings from modelling and analysis
4. Next steps

Each workshop session took the same approach and lasted 1.5 hours. Potential participants were invited directly by email and asked to register for sessions through a link provided in the email to join the virtual MS Teams webinar. The session began with a land acknowledgement, and was followed by a brief introduction, the agenda for the session, and some housekeeping.

There were defined opportunities throughout the sessions for participants to ask questions and discuss the materials. Participants were asked to provide feedback through chat, or by using the "raise your hand" function of the virtual meeting platform. A copy of the presentation and post-session feedback survey was shared with attendees following the session.

Round 2

The Round 2 Interested Parties presentation shared the 2025 IRP road map. The session included an overview of recommended development plan, learnings, near-term actions and signposts.

It was emphasized that the recommended development plan was being shared for awareness (inform level of engagement) and that we would report back on any feedback received, but it would not result in any changes to the roadmap. The workshop sessions sought feedback on how we move forward together on the near-term actions and additional indicators or signposts that might help identify changes in the energy landscape. The workshop involved a detailed presentation divided into three main sections:

1. Introduction
2. Road Map
    - Recommended development plan and the resources included
    - Alternative development plan
    - Learnings
    - Near-term actions
    - Signposts
3. Next steps for the 2025 IRP

Each workshop session took the same approach and lasted 1.5 hours. Potential participants were invited directly by email and asked to register for sessions through a link provided in the email to join the virtual MS Teams webinar. The session began with a land acknowledgement, and was followed by a brief introduction, the agenda for the session, and some housekeeping.

There were defined opportunities throughout the sessions for participants to ask questions and discuss the materials. Participants were asked to provide feedback through chat, or by using the "raise your hand" function of the virtual meeting platform. A copy of the presentation and post-session feedback survey was shared with attendees following the session.

2.2. IP Pre-Engagement Survey Questions

1. Manitoba Hydro is seeking your feedback on our upcoming virtual and in-person sessions aimed at gathering input for the 2025 Integrated Resource Plan. To help us identify the respondents, please provide your name and email address before completing the survey.

2. This month, Manitoba Hydro will host interactive virtual sessions to gather input for our 2025 Integrated Resource Plan. Each session is expected to last 1-2 hours. Please select all dates that work best for you to attend:
   a) November 14 – 9:00-11:00am
   b) November 18 – 9:00-11:00am
   c) November 18 – 1:00-3:00pm
   d) November 28 – 1:00-3:00pm
   e) November 29 – Times to be confirmed
   f) None of these dates work for me; please contact me if additional options become available.
   g) I am not interested in attending a virtual session.

3. This fall, Manitoba Hydro will be providing additional engagement sessions to help inform our 2025 Integrated Resource Plan. Would you be interested in participating in a session assuming you are available?
   a) Yes, to either an in-person or a virtual session
   b) Yes, to an in-person session only
   c) Yes, to a virtual session
   d) No, our organization is not interested in attending
   e) No, our organization is not interested in attending but would prefer to receive a session summary by email.
   f) Other (Please specify)

4. Where in Manitoba are you located (Open text)

5. If you were to attend an in-person session, which month(s) would work for you:
   a) November 2024
   b) December 2024
   c) January 2025
   d) Unsure

6. Do you require ASL interpretation or other accommodations to participate?

7. Are there any other contacts within your organization we should communicate with regarding the 2025 Integrated Resource Plan? If so, please provide the following details:

a) Name (Open text)
b) Position (Open text)
c) Organization (Open text)
d) Contact Email (Open text)
e) Contact Phone (Open text)

8. What topics in our 2025 Integrated Resource Plan are you most interested to learn more about (select all that apply):
a) Developing key inputs and scenarios
b) Modelling, analysis and evaluations
c) Preliminary recommendation/outcomes
d) Other (Open text

2.3. IP Pre-Engagement Survey Summary

The Interested Parties pre-engagement survey was sent to approximately 120 interested parties, and the feedback was used to influence the engagement approach with Interested Parties. The survey was open from October 25, 2025, to November 1, 2025, and received 29 responses from 25 unique organizations.

The session timing was informed by participant availability – identifying November 14, 18, and 28 as the preferred dates for engagement.

- 78% of respondents indicated either in-person or virtual sessions would work for them, while 22% indicated they would attend a virtual session only.
- Respondents indicated they lived primarily in Winnipeg, but also included several from Brandon (4), Arborg (1), and Winkler (1).
- If an in-person session was held, respondents did not indicate a preference for November, December, or January.
- No respondents indicated a requirement for ASL interpretation; however one accommodation was identified with the respondent indicating this could be mitigated through hosting the session online.
- Respondents were generally interested in all topics within the 2025 Integrated Resource Plan scope; however a few (6) respondents indicated an interest in the development of key inputs and scenarios and preliminary recommendations/outcomes, and one respondent was only interested in the modelling, analysis, and evaluations.

2.4. IP Round 1 Presentation and Information Handouts

This section includes the following materials:

- Presentation: Round 1 Engagement
- Information Handout: *Our Development Process*
- Information Handout: *Key Inputs and Scenarios*
- Information Handout: *Evaluation metrics*

2025 Integrated Resource Plan

Round 1 Engagement

Fall 2024

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

Land acknowledgment

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, Cree, Anishininew, Dakota, and Dene peoples and the homeland of the Red River Métis.

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

Agenda

Purpose:
Understand what matters to you as we plan for Manitoba's energy future.

Topics:

1. Introduction
2. Share and seek feedback on the 2025 IRP key inputs and scenarios
3. Share and seek feedback on the 2025 IRP evaluation metrics
4. Next steps

What is an Integrated Resource Plan?

- A utility best practice used across North America to understand and prepare for future energy needs.
- A repeatable process that plans for long-term needs and will be updated as future conditions evolve.
- One output of the ongoing planning cycle at Manitoba Hydro.
- Includes engagement to incorporate feedback from customers and interested parties.

An IRP is a utility best practice. If you google, Integrated Resource Plan, you will find many examples from utilities across North America. Every IRP is unique to a utility's needs or legislative requirements, but they do have some comment elements. An IRP typically has a long-term outlook, usually 20 years out; however, looking out to 2050 is becoming more common at present due to net zero policies. An IRP examines customers' future needs and aims to answer how those needs might be met. An IRP is a repeatable process; typically repeated about every 2 to 3 years. And, a key component of developing an IRP is engagement – bringing customers and interested parties along in the journey to develop the IRP. A IRP usually results in a road map – often with specific actions or commitments that the utility makes to ensure future customer needs are met.

The 2023 Integrated Resource Plan

- Primary objective was to plan for safe, reliable energy that meets the evolving needs of Manitobans at the lowest cost possible.
- Studied how the energy transition could impact our natural gas and electricity systems including generation, transmission and distribution.
- Resulted in a road map that included signposts and near-term actions
- Notable learnings from the 2023 IRP:
  - The energy transition is already underway in Manitoba
  - Investment is required in all scenarios
  - Natural gas will play a role in getting to a low carbon future

Manitoba Hydro has been planning for decades; however, the 2023 IRP was our first Integrated Resource Plan. This provided an opportunity to establish an IRP process in Manitoba and include customers and interested parties in the energy planning process. The 2023 IRP took over 2 years to develop and in 2021, the concept of the energy transition was still forming, and there was question of if or when the transition would come to Manitoba. Through engagement and analysis, we confirmed that the energy transition is already happening in Manitoba. The 2023 IRP focused on answering what the future could look like and what we should do now to be prepared for the future.

Why we need the 2025 IRP now

We need a development plan approved as soon as possible

- We need new resources as early as 2029/30.
- The Manitoba Hydro Act requires Manitoba Hydro to recommend a development plan for approval, prepared as part of an Integrated Resource Plan that is informed by engagement.

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 programs to manage energy use during peak demand.

2025 IRP Round 1 Engagement 6

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 capacity supply could be needed as early as fiscal year 2029/30 and new dependable energy could be needed in 2031/32. It takes time to implement supply solutions and the pathway to approving and implementing those solutions is through an approved development plan. Therefore, the 2025 IRP is required now and will result in a recommended development plan.

The 2025 Integrated Resource Plan will…

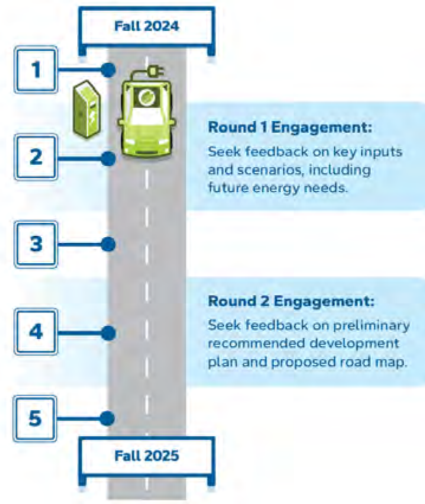
- Result in a road map that will include a recommended development plan of ~10 years.
- Include analysis that extends to 2050.
- Include all energy infrastructure, non-MH owned assets, and investments to defer need for new infrastructure.
- Consider policy from all levels of government, such as federal, provincial, and municipal.

The recommended development plan for the 2025 IRP is intended to capture investment decisions required now. As you will see later in our key inputs discussion today, there is a significant increase in uncertainty after approximately 10 years into the future, from today. Given that decisions must be made now to ensure capacity and energy needs are met in the late 2020s and early 2030s, the recommended development plan for the 2025 IRP will focus on approximately the next 10 years. Analysis for the IRP, however, will go to 2050 so that we can still identify if there are actions to be taken now to prepare for the long-term future, including 15, 20 and 25 years into the future.

As an integrated utility with both electricity and natural gas systems, Manitoba Hydro will undertake an integrated resource plan that includes both our electric and gas systems including all energy infrastructure including, generation, transmission, distribution and non-wires solutions such as energy efficiency. And as always, this IRP will consider existing and highly anticipated energy-related policy from municipal, federal, and our provincial governments.

2025 IRP process overview

1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan



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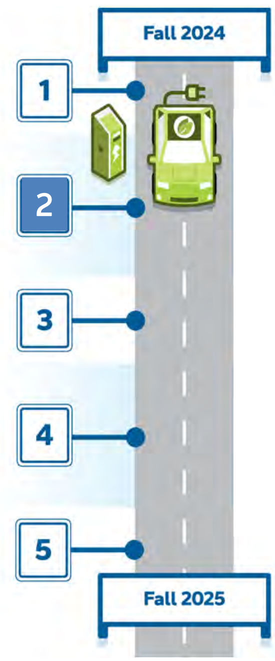
The development process for the 2025 IRP consists of five steps. Setting direction was completed in advance of today and resulted in this process you see here. We also determined what the outputs of the 2025 IRP will be – a 10-year development plan, and a longer-term road map based on analysis out to 2050. We are now in the second development step, and today you will see proposed key inputs and scenarios that we are seeking your feedback on. We will also be seeking your feedback on our proposed analysis approach and evaluation metrics so that after this round of engagement, we can complete the third step, modelling and analysis. We will then prepare a preliminary recommendation. In Round 2 Engagement, planned for Spring 2025, we will be seeking your feedback on a draft recommended development plan and alternative development plans. Over Summer 2025 we will be reviewing the feedback from Round 2 engagement and preparing the final Integrated Resource Plan report and engagement report, which we anticipate will be published in Fall 2025. This concludes an introduction to the 2025 IRP.



Step 2. Develop Key Inputs and Scenarios

9

As mentioned, we are now in our second step in our process, develop key inputs and scenarios.

We will spend the rest of this session discussion this step, where there is a significant amount of work done to prepare for the 2025 IRP analysis, which is done is step 3.

We will now introduce what is included in this step.

Step 2. Develop key inputs and scenarios

What is included in this step of the 2025 IRP development process

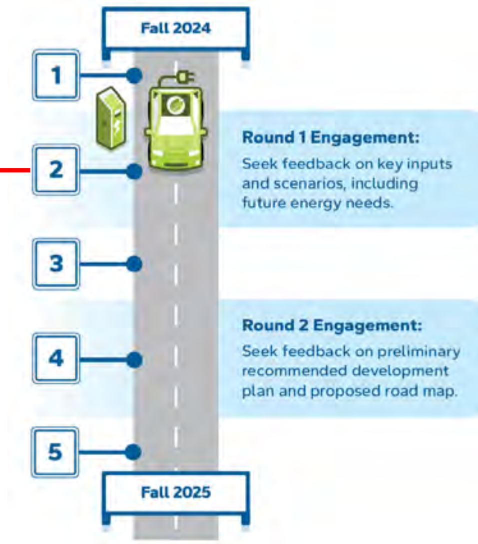
Step 1. Setting direction

Step 2. Develop key inputs and scenarios
- Planning assumptions
- Key inputs
  - Load projections
  - Resource options strategies
- Scenarios
- Establish evaluation metrics

Step 3. Modelling, analysis and evaluations

Step 4. Recommended development plan

Step 5. Finalize the Integrated Resource Plan



2025 IRP Round 1 Engagement 10

Step 2 really sets the foundation for the IRP. The work completed in this step will be carried throughout the 2025 IRP analysis – it will directly impact the recommended development plan that will be created as part of this IRP. This is why it is so important to speak to you now, so your feedback can be incorporated.

To quickly set the stage of what we will be discussing, we will give you an overview of everything that is done in Step 2.

We first start with establishing our planning assumptions. We gather information and data from a wide variety of sources to inform the planning assumptions. Planning assumptions are the basis for which the key inputs are established.

For the 2025 IRP, the key inputs include the load projections and resource options strategies.

Resource options strategies are something new proposed for the 2025 IRP and we will discuss these further.

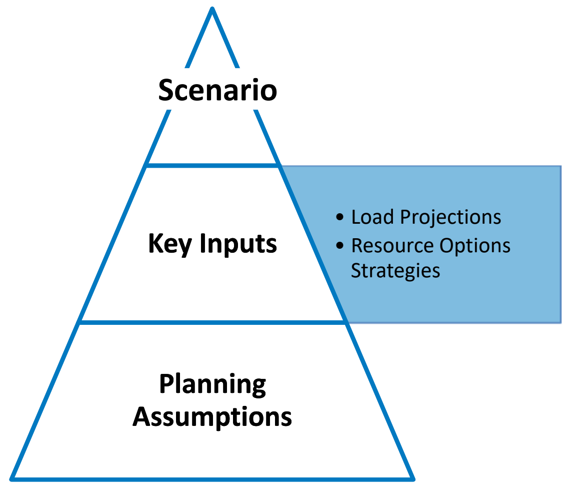
Scenarios are established to reflect various energy futures.

Also in Step 2, we prepare for our evaluations that will be done in Step 3 (modelling, analysis and evaluations). We establish what the evaluation metrics will be, so we can make sure the modelling and analysis is designed to output the necessary information.

Developing key inputs and scenarios

Underpinned by planning assumptions

- The **planning assumptions** underpin the key inputs.
- **Key inputs** for the 2025 IRP include:
  - **Load projections**
  - **Resource options strategies**
- A **load projection** and a **resource option strategy** are combined to create an energy future **scenario**.



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We mentioned a few terms on the last slide: planning assumptions, key inputs, and scenarios.

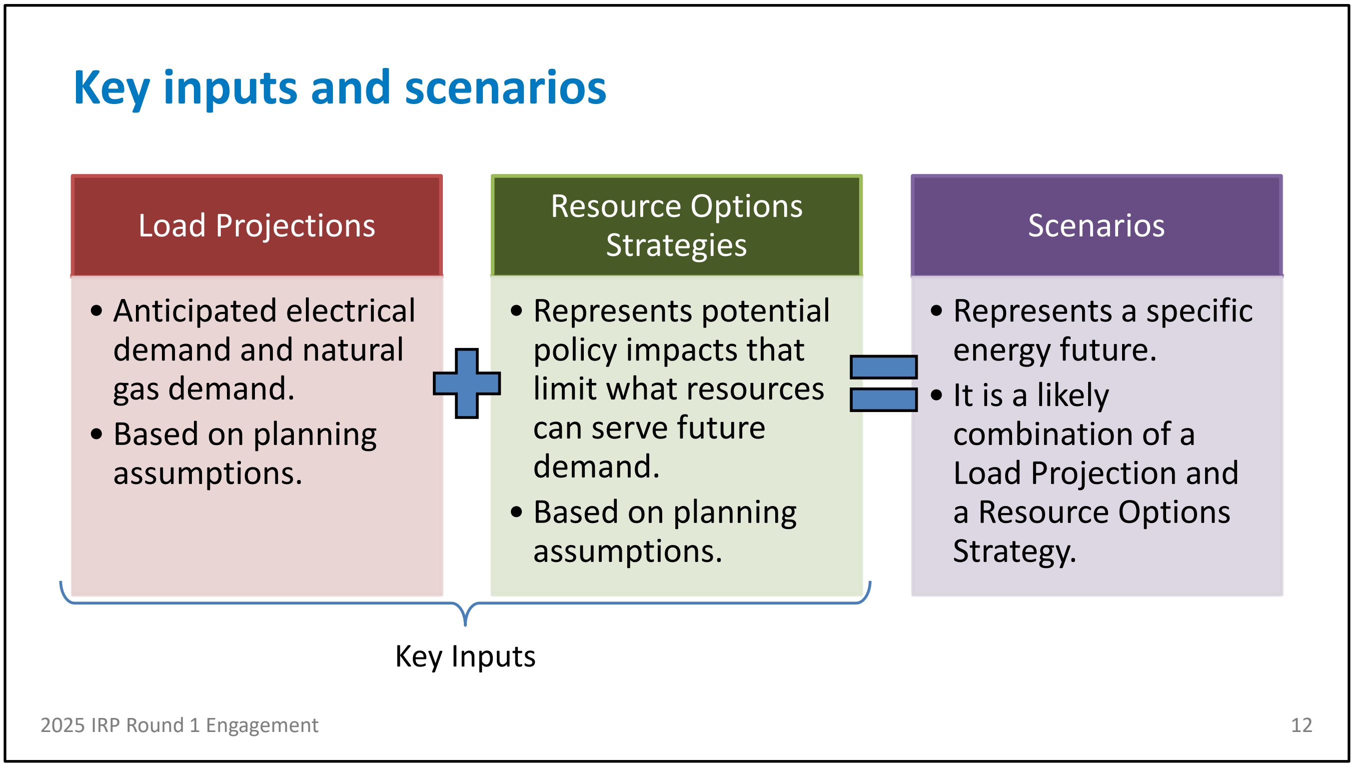
There is a specific relationship between these items and it starts with the planning assumptions.

The planning assumptions underpin the development of the key inputs and the scenarios. Planning assumptions are set to represent many different things, like how fast EV uptake will be in Manitoba, or what building codes are assumed, or what will be the price of imports in the future. As we speak to the key inputs and scenarios further, we will share some of the planning assumptions that are proposed.

For the 2025 IRP, the key inputs will include the load projections (for both electricity and natural gas) and the resource options strategies. These are key inputs into the 2025 IRP because they have significant uncertainty and how they are set will impact the analysis.

When we combine a load projection with a resource option strategy, we end up with a scenario.

As we move up the hierarchy from the planning assumption to the scenarios, we move from individual assumptions into the representation of a specific energy future.



Another way to visualize the key inputs and scenarios is shown on this slide.

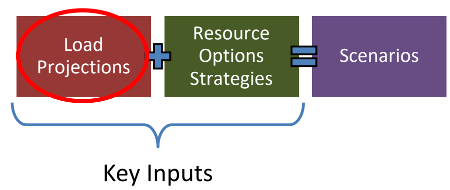
Load projections are the electric and natural gas demand in the IRP analysis. The planning assumptions underpinning the load projections are those that will influence energy use.

For the resource options strategies, the planning assumptions are those that will influence how energy is served, and we know form past work, that this is often done through policy. So for the 2025 IRP, the resource options strategies were brought in to represent potential policy that influences what resources are available to serve future demand.

Scenarios represent a specific energy future. By combining a load projection and a resource options strategy, we have full representation of a specific energy future based on the combined planning assumptions.

Load Projections

Key Inputs



We will be walking through the development process of the Load Projections, which is the first key input in the development of scenarios that will be evaluated as part of our 2025 Integrated Resource Plan.

Load projections

Overview

- Load projections show the energy demand Manitoba Hydro might be required to serve.
- Planning assumptions are common between electricity and natural gas.
- The net-zero economy by 2050 future is uncertain and could result in a range of electricity and natural gas demand that needs to be served by Manitoba Hydro.
- Three proposed load projections:

Load Project	Assumes…
1 - Baseline	Minimal changes from current policies and customer decisions.
2 - Medium	Moderate impact from government actions and customer decisions.
3 - High	Significant impact from government actions and customer decisions.

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Load projections are the energy demand that Manitoba Hydro **might be required to serve** for both electricity and natural gas.

Planning Assumptions **that underpin each load projection** ensure they **are common across both electric and natural gas** (i.e. customer choosing to electrify a natural gas process would see an increase in electric consumption and a decrease in natural gas usage.)

A net zero economy brings into consideration **greenhouse gas emissions** and the concept of **net-zero economy by 2050 is becoming more prevalent for Manitobans**

- Included in Manitoba Hydro's mandate
- Introduced in Manitoba's Affordable Energy Plan
- Within Federal policy

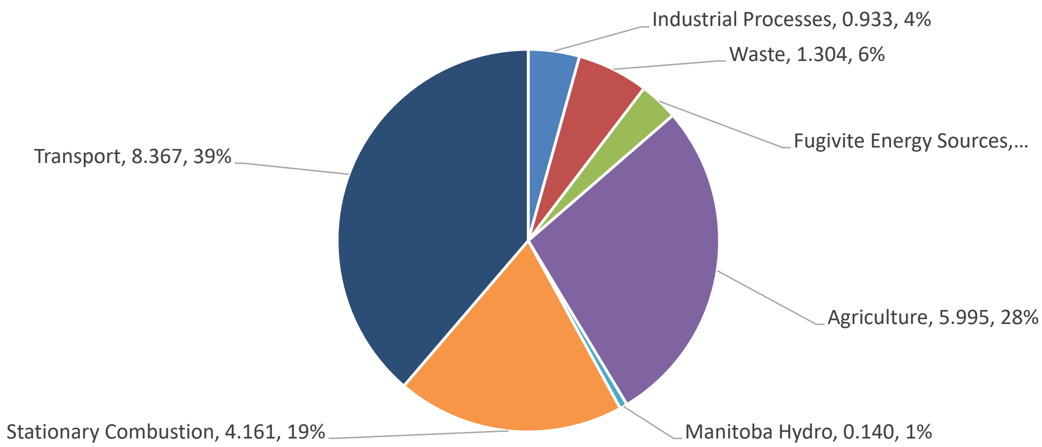
There is **significant uncertainty about how Manitobans** achieve a net-zero economy by 2050 and different customer actions (whether its residential, commercial or industrial) may affect the amount and pace of change to both the electric and natural gas consumption.

It is important as part of the 2025 IRP to **evaluate a broad range of potential load projections** for electricity and natural gas required to be served by Manitoba Hydro.

Manitoba Hydro are **proposing 3 load projections** recognizing different combinations of policy actions and customer decisions which will drive different electrical and natural gas energy demand.

Manitoba Greenhouse Gas Emissions

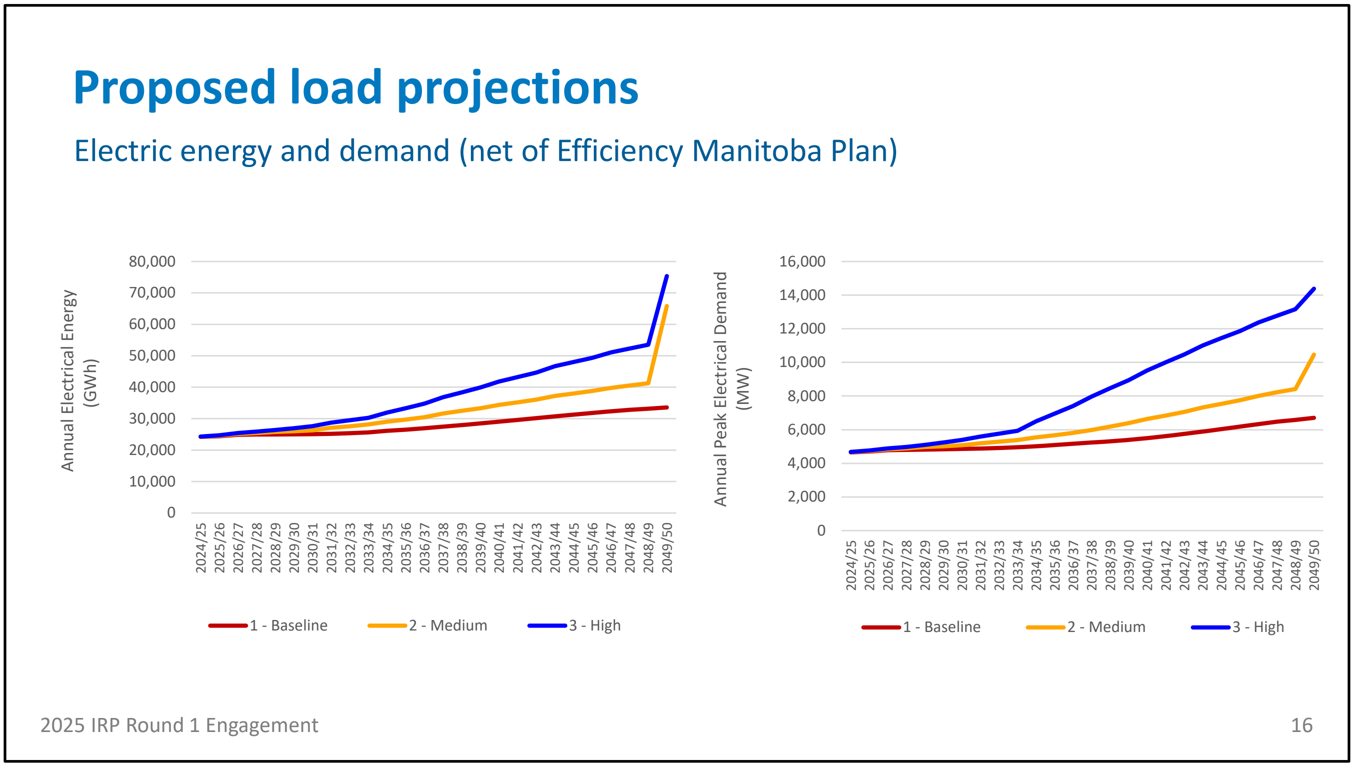
Average Manitoban GHG Emissions Between 2018 - 2022 (21.6 Mt per year)



Further descriptions of the categories and subcategories found in Table A9-1 in the NIR Part 3
https://publications.gc.ca/collections/collection_2024/eccc/En81-4-2022-3-eng.pdf

As we further discuss about a net zero economy, we thought it would be important to understand the greenhouse gas emissions in Manitoba. While this is a very brief overview of the emissions in Manitoba, We currently have just under 22 Megatonnes of carbon emission in Manitoba and the pie chart shows the breakdown of emissions which is led by the transportation sector, agriculture and stationary combustion (mostly identified as burning fossil fuel for heating).

Ultimately moving forward towards a net zero economy will be looking to remove as many of these emissions such that we can attempt to **reduce the negative emission technology, like direct air carbon capture** required to offset any remaining emissions by 2050.



This slide provides the preliminary estimates for each of the three load projections which are each based on a theme in the planning assumptions.

The **Baseline load projection** depicted in red assumes lower economic growth and that there is little change from what Manitobans are currently doing today, where customers continue to select the most economic decisions when it comes to their energy needs.

The **High load projection** depicted in blue represents accelerated actions towards a net-zero economy and assumes that much of the electric demand will need to be served by Manitoba Hydro

- This will include planning assumptions that skew toward electrification as a means of decarbonization
- Includes policy assumptions to phase out natural gas leveraging an approach to electrify as existing systems reach end of life
- As shown on the energy and demand charts, Load Projection 3 includes assumptions on carbon capture technology to offset any remaining emissions by 2050.
- Conversely the higher focus on electrification leads to the largest reduction from the natural gas system

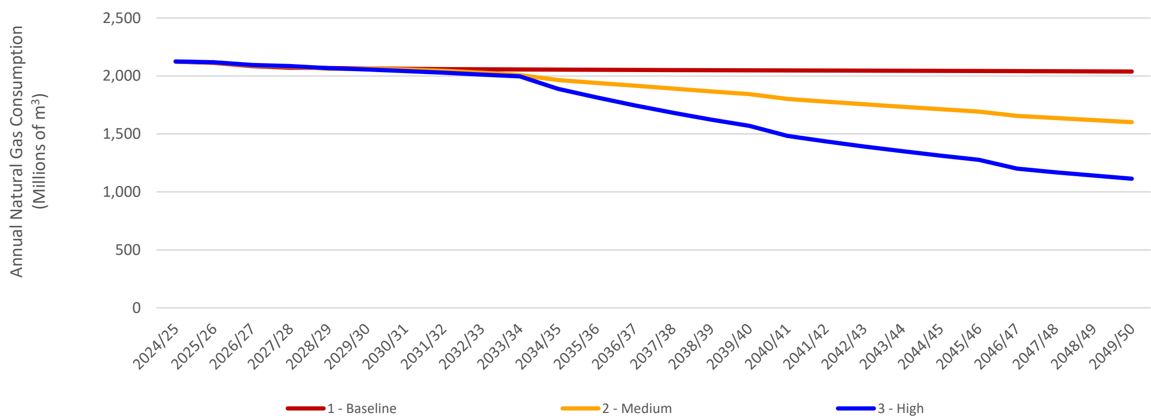
The **Medium load projection,** depicted in yellow assumes actions towards a net-zero economy by 2050 and recognizes this demand is not fully served by Manitoba Hydro

- This will include decisions on planning assumptions where alternative to full electrification are explored, such as self-generation, dual fuel heating and carbon capture technology etc.

- Recognizing lower electrification, we'll see the corresponding natural gas volume being higher than Load Projection 3 that will be displayed on the next slide

Proposed load projections

Natural gas (net of Efficiency Manitoba Plan)



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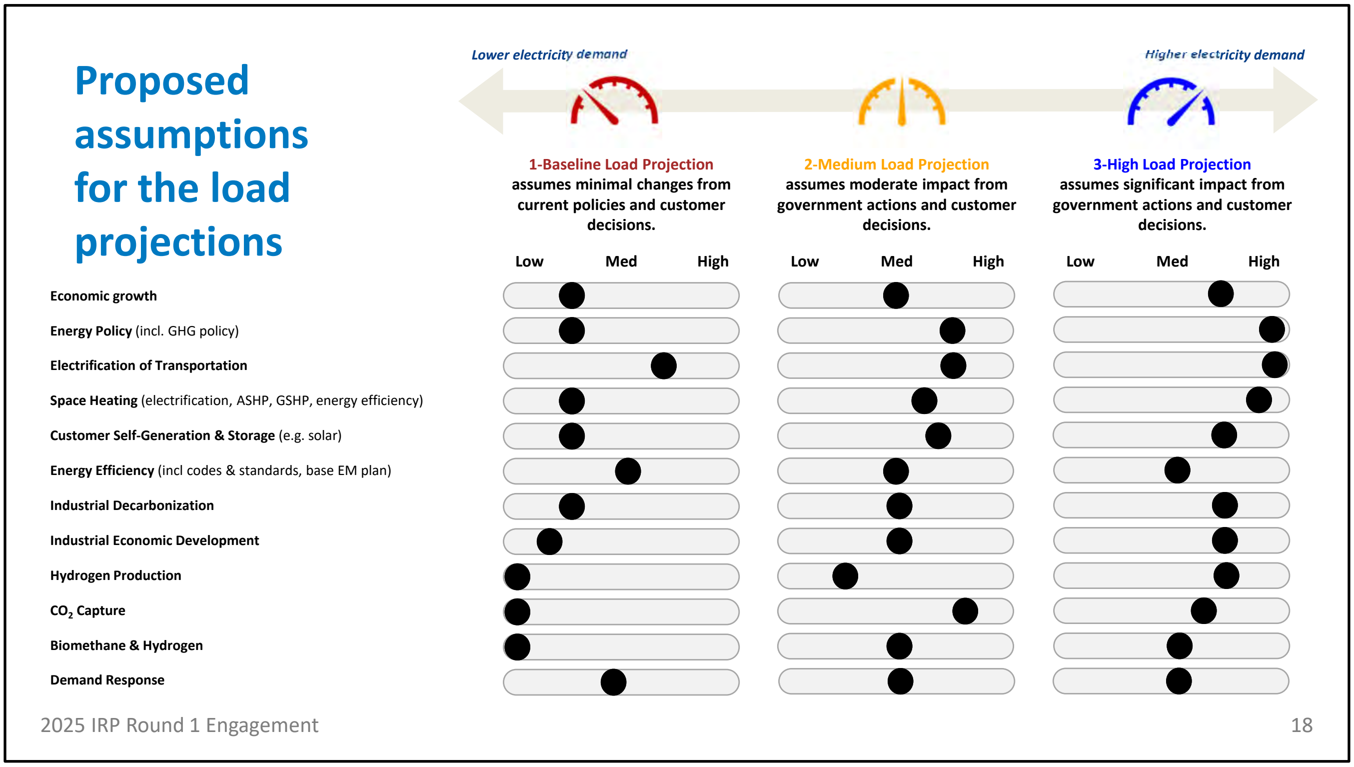
This chart displays the natural gas volumes associated with each of the three electric load projections depicted on the previous slide highlighting the importance of natural gas across all three load projections prepared.

It is important to note that a net-zero 2050 in Manitoba may **still** result greenhouse gas emissions within Manitoba and **assume that are negative emission technologies** in place to offset the emissions like a **Direct Air Carbon Capture system** as highlighted in Load Projection 3 shown on the previous slide.



Included in this slide are the planning assumptions with the greatest potential impact in each of the load projections. To familiarize yourself with the slide, you will notice the three load projections across the top, along with the key planning assumptions on the left-hand side.

This slide is illustrating the range of decisions for each of the different planning assumptions across each of the load projections. A few key points to identify:

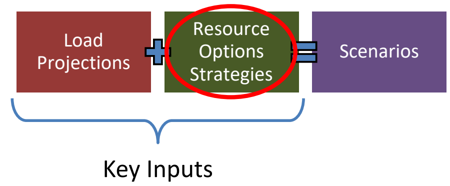
- There are numerous assumptions that are included
- Some have greater level of uncertainty
- All the inputs are independent, though there are some correlations → energy policy and electrification of transportation as an example

It is important as part of the process of re-examining the assumptions → the decisions made here have big influence on the outcomes of the IRP

As we leave this slide, please recognize that the amount and pace of change in the energy landscape is very difficult to predict. The purpose of the three load projections is to develop a broad range of potential energy futures recognizing that the future that will unfold may end up weaving through all three of the potential load projections and while we do create each load projection with a set of assumptions, we do recognize that some of these assumptions can easily offset each other and end up producing the same line you saw on the electric and natural gas charts in the previous slides.

Resource Options Strategies

Key Inputs



The second key input to the 2025 IRP is the resource options strategies.

The load projections reflect planning assumptions that influence potential energy demand.

The resource options strategies reflect planning assumptions that influence resources that are available to meet energy demand.

Resource options strategies

Overview

- Resource options strategies reflect the potential ways Manitoba Hydro may be required to meet electricity and natural gas demand.
- Policy is a key driver that influences what resources may be allowed to serve energy needs.
- The strategies are based on the full inventory of resource options available to meet future energy needs in Manitoba.
- The different strategies reflect a range of potential policies that could influence the resource options.

As noted before, it is policy is the likely the avenue to influence resources available to serve demand and we build in assumptions on policy into the resource options strategies.

We start our modelling and analysis with a full inventory of available resources, and then assume various potential policies that would narrow down that list.

In this way, we make sure that the analysis and its outputs can be robust to a range of future potential policies.

Proposed resource options strategies

Four proposed strategies and their assumptions

Resource Options Strategies		Assumptions
A	Technology Neutral	Compliant with federal Clean Electricity Regulations.
B	Net-Zero Grid 2035	Strategy A, plus requirement that electricity grid is net-zero by 2035.
C	Near Term Wind Generation Projects	Strategy B, plus up to 600 MW of Indigenous majority owned wind with dispatchable resources for reliability.
D	No Fuel-Based Resources	Strategy B, plus requirement of no fuel-based combustion turbines post 2035 (i.e. no natural gas, hydrogen, biomethane, or biomass generation).

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For the 2025 IRP, there are four proposed resource options strategies. As just noted, we start with a full inventory of resource options and then as we move down this table, we are narrowing what resources options are available for the modelling and analysis.

- Strategy A (Technology Neutral) is our starting point and reflects current policy. It is compliant with the draft federal Clean Electricity Regulations. This means that the operation of any emitting resource will be compliant with the drafted emission limits. As drafted, the draft Clean Electricity Regulations will have minimal impact on how Manitoba Hydro operates our system.
- Strategy B (net-zero grid 2035) builds on Strategy A to include an additional requirement to ensure the grid is net-zero by 2035. This reflects the Manitoba Hydro mandate letter from 2023. Net-zero grid means that generation emissions are allowed, but these emissions must be balanced by removing the same amount from the air through other means (such as RNG offsets, credits, etc.).
- Strategy C (near term wind generation projects) builds on Strategy B, to ensure wind generation is in alignment with Manitoba's Affordable Energy Plan. There is also a need to ensure dispatchable resources are in place to ensure the reliability of our current electricity system along with any other resources that are added – the exact dispatchable resource will be identified through the modelling and analysis.
- Strategy D (no fuel-based resources) also builds on Strategy B, but increases the

influence of the restriction by not allowing any fuel based combustion.

Resource options strategies

Examples common planning assumptions

Electricity and natural gas system characteristics
- System hydrologic inflows
- Current power generation supply mix
- Interconnections with neighbouring markets

Modelling and analysis parameters
- Transmission planning criteria
- Generation planning criteria for dependable energy and capacity
- Fuel availability and cost (e.g. natural gas, biomethane)
- Demand driven natural gas and electric delivery system costs
- Firm export contracts are not renewed
- Demand side resources (e.g. Efficiency Manitoba plan, demand response)

Resource options inventory

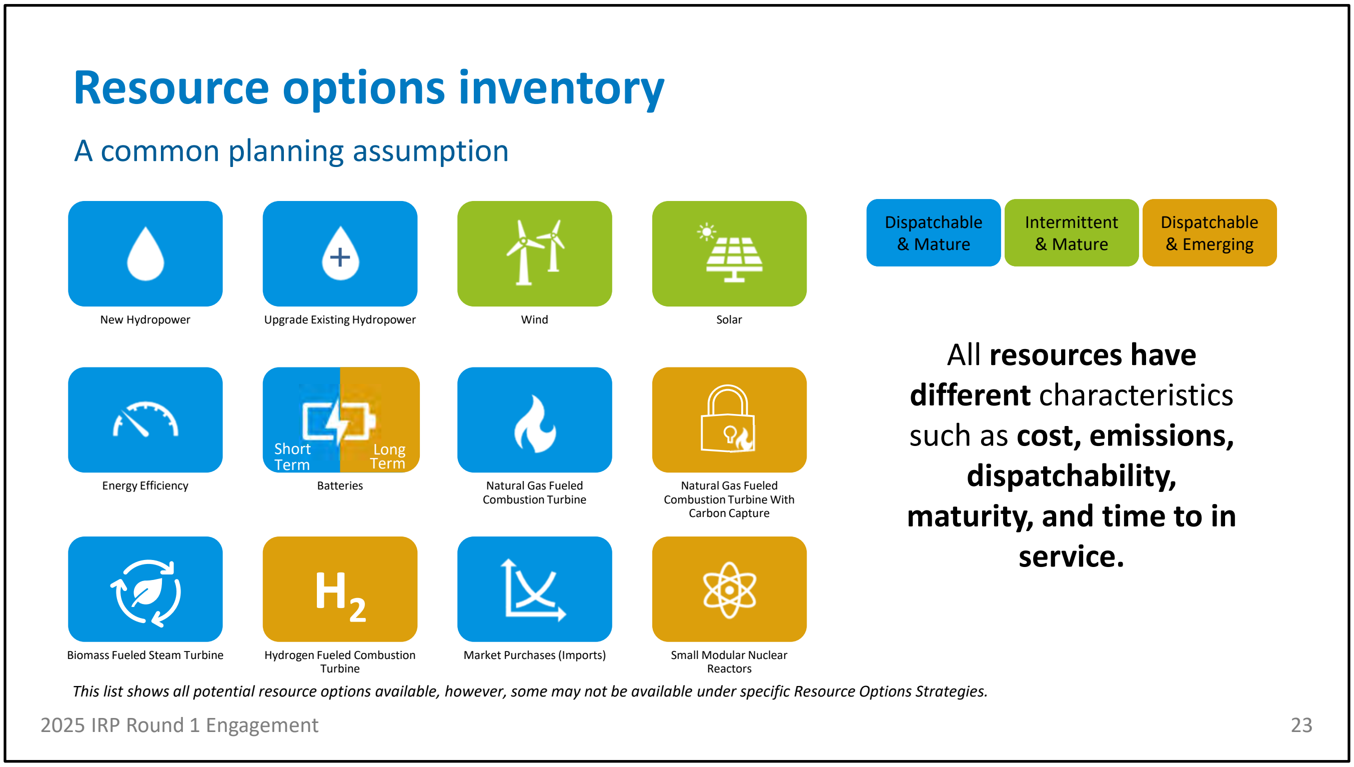
The policy influences on the previous slide are the planning assumptions that change between the resource options strategies.

There are also many other planning assumptions that do not change, or are common between the resource options strategies.

On example is the representation of our electricity and natural gas systems. There are many different characteristics that are included in the modelling and analysis, including what water inflows are assumed, current generation resources on the system, and how we are connected to our neighbours (like Saskatchewan and the United States).

The modelling parameters reflect key assumptions that are built into the model. The transmission and generation planning criteria are fundamental criteria that we need to meet. These ensure that planning results in the reliability of our systems in all conditions. There are also assumptions set on how much fuel is available and its costs. How we reflect our current export contracts is another parameter – in the case of the 2025 IRP, we are assuming that existing firm contracts are not renewed when they expire, so that energy can be used for Manitoba needs. There is still assumed to be opportunities to continue interactions with short-term markets as operating conditions allow.

The last example of the common planning assumptions is the resource options inventory. Let’s go to the next slide to explore the inventory further.



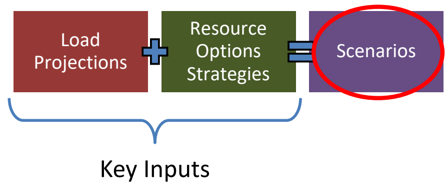
This slide shows the resources options inventory and some of the more common resource options. These are resources that we know to be high potential solutions to serve load.

Each resource option has specific characteristics that that together, reflect the resource options' capability to potentially serve future demand. Examples of such criteria include:

- If the resource is best to serve electrical energy needs or is dispatchable and better serves capacity needs
- The cost to build and operate the resources
- The time it will take to properly plan, design, construct and put into service
- If the resource is a mature, proven resource, or if it is emerging

Scenarios

Including Sensitivities



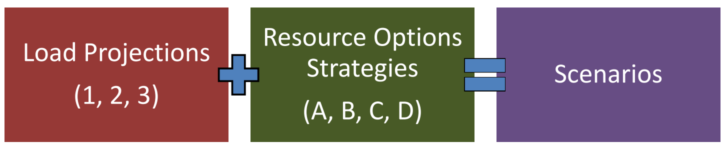
We have just heard about our key inputs, specifically Load Projections and Resource Options Strategies.

Now, we will pull this together and walk through how these elements combine to create the scenarios which will be used in this IRP.

Scenarios

Overview

- Scenarios are a likely combination of a Load Projection and Resource Options Strategy.
- Scenarios represent the energy futures.
- Aiming to have a group of scenarios that together, represent a reasonable range of what the energy future might look like in Manitoba.



Let's explore scenarios.

Scenarios are a likely combination of Load Projections and Resource Options Strategies which will represent potential energy futures.

Our goal here is not to identify and analyze every possible combination of inputs but instead to develop a group of scenarios that together, represent a reasonable range of what the energy future might look like in Manitoba.

Proposed scenarios

Eight proposed scenarios represent different energy futures

Resource Options Strategies	Load Projections		
	1 - Baseline	2 - Medium	3 - High
A - Technology Neutral	S1A	-	-
B - Net-Zero Grid 2035	S1B	S2B	S3B
C - Near Term Wind Generation Projects	S1C	S2C	S3C
D - No Fuel-Based Resources	-	-	S3D

S = Scenario
Scenarios range from **1A to 3D**, where the number represents a **Load Projection** and the letter represents the **Resource Options Strategy**.

Only likely combinations of load projections and resource options strategies will be studied.

- Those proposed not to be studied are noted by (-).

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Scenarios for this IRP are shown here. There are eight proposed scenarios which come from pairing logical combinations of a Load Projection and the Resource Options Strategy. A common link between the Load Projection and the Resource Options Strategy is their underpinning planning assumptions, particularly energy policy. Therefore, if there is a strong energy policy restriction on a resource option and the operation of our electricity and natural gas systems there would be similar government action impacting energy consumption.

During this IRP we will not study unlikely combinations of Load Projection and Resource Options Strategies shown by the dashes. By not running every Load Projection with every Resource Option Strategy, we can save significant computing and analysis time and focus our analysis on scenarios that will have the most influence on our recommended development plan.

For this IRP, Scenarios 1A and 3D are bookends. In Scenario 3D we have the most restrictive energy policy and on the opposite end with Scenario 1A we have the least restrictive energy policy.

Modelling and analysis approach

Potential development plans

- In the modelling and analysis, scenarios produce potential development plans.
- A development plan outlines the required steps to meet future energy needs.
  - It may include building new energy sources, infrastructure or programs to manage energy use during peak demand.
- Sensitivity analysis will test the robustness of the potential development plans against different risks.

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These scenarios will be used in modeling and analysis to produce potential development plans.

A development plan will outline the steps required to meet future energy needs. This may include building new energy sources, infrastructure or programs to manage energy use during peak demand.

Recognizing there is uncertainty in the assumptions that form our scenarios, we will undertake a sensitivity analysis as part of our modeling and analysis.

Sensitivity analysis

Test key planning assumptions that have a high potential to impact results

Proposed sensitivities:

- Higher or lower market prices
- Increased capital costs for new resources
- Delays in new resource construction
- Lower or higher water inflow conditions (climate change)
- New hydrogeneration and capacity enhancements at existing hydro stations

Not all sensitivities will be run on every scenario.

Sensitivity analysis, or what-if analysis, helps us to understand how individual inputs or constraints change a development plan.

This means we can test the robustness of the outcomes against different risks and understand if that will change the outcomes.

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Sensitivities are a great way to test how changes in one assumption in our scenarios may impact our potential development plans.

Some typical sensitivities we will study include energy market prices, capital costs, project lead times, and further resource option restrictions.

The sensitivities listed here are examples of what may considered in this IRP. The full list of sensitivities will evolve as modeling results become available ensuring we address the relevant questions that arise.

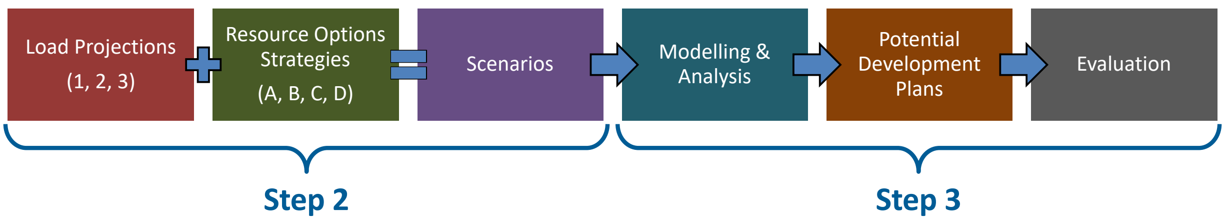
We are prioritizing sensitivities that will have the greatest impact in the next 10 years and could influence our recommended development plan.

Next steps towards evaluation

In Step 3 – Modelling, analysis and evaluations:

- Approximately 50+ scenarios and sensitivities will be analyzed.
- Result will be a series of potential development plans for evaluation.
- Evaluation includes applying evaluation metrics to these potential development plans.

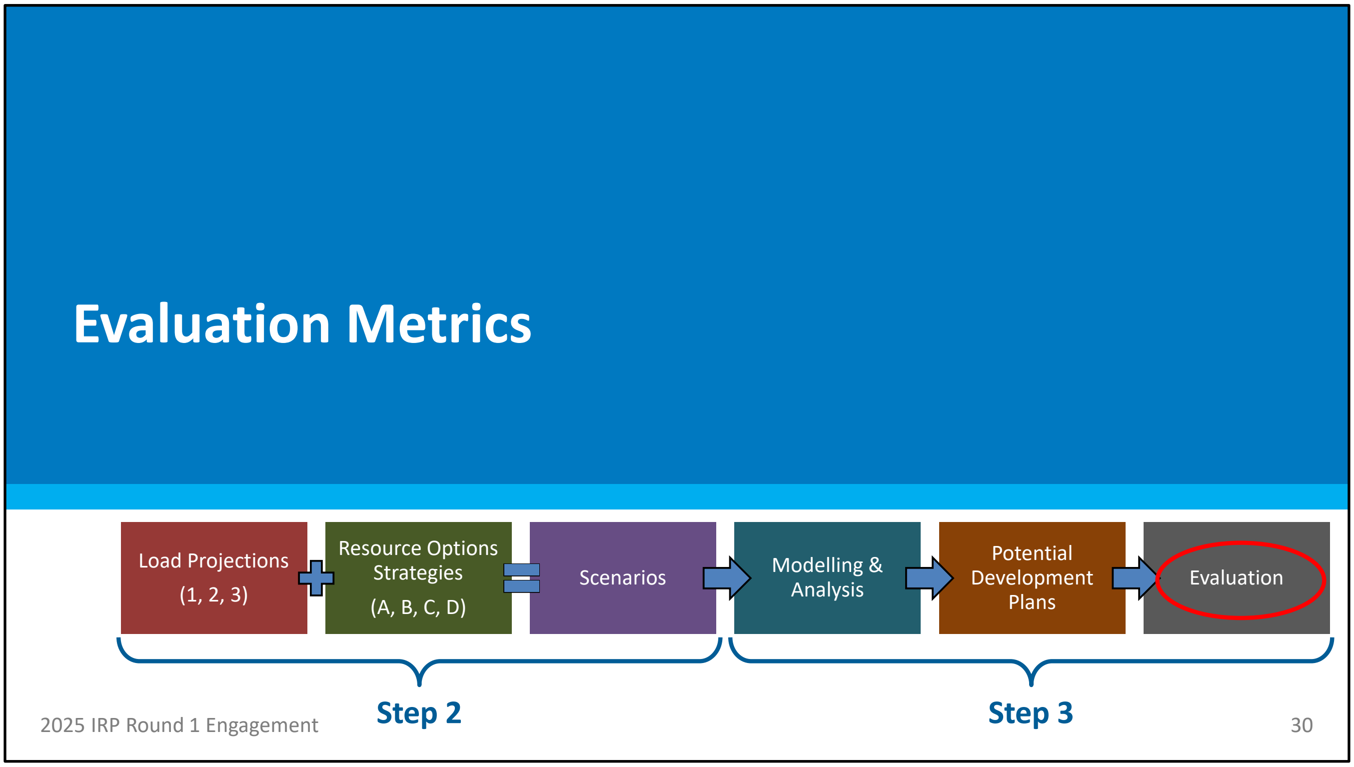
In Step 2 – develop key inputs and scenarios, we establish the evaluation metrics to prepare for Step 3.



At the end of our modeling and analysis process, we anticipate studying approximately 50+ sensitivities.

And through this analysis, we will identify a series of potential development plans that will need further evaluation, through our evaluation metrics.

This leads us to preparing the evaluation metrics, which we walk through next.



As introduced, we are currently establishing evaluation metrics to be used in Step 3.

We will briefly explain what are evaluation metrics, and how they will be used to arrive at a recommended development plan.

Following that, we will present the proposed evaluation metrics for your feedback.

Evaluation metrics

What are evaluation metrics and how will they be used?

- **Modelling & Analysis** identifies cost-effective potential development plans that meet reliability planning criteria, mandates and regulations.
- **Evaluation** narrows the list of potential development plans towards a recommended development plan using evaluation metrics.
- **Evaluation Metrics:**
  - reflect what Manitobans have shared are important factors for them.
  - are used to compare and assess trade-offs between potential development plans.
  - can be numbers-based (quantitative) or descriptions (qualitative).
  - need to be established early in the process ahead of evaluation taking place.

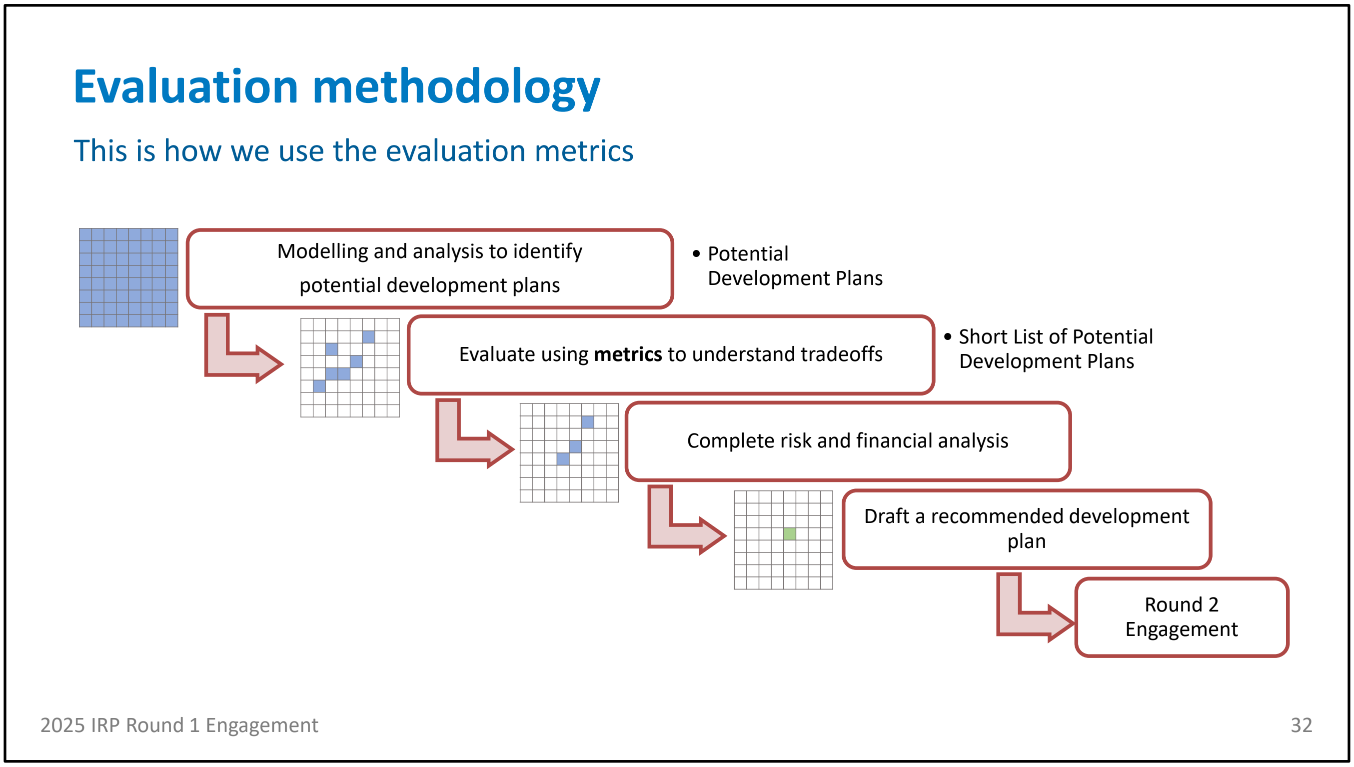
Modelling and analysis is used to identify cost-effective potential development plans that meet established reliability planning criteria, mandates and regulations. As just explained, this work will identify **a number of robust potential development plans.**

We want to go further and **evaluate** these plans from a broader perspective based on what we understand is important to Manitobans. Using metrics, we will evaluate potential development plans to narrow the list of options and ultimately arrive at a draft recommended development plan.

What are metrics?

- They are measures meant to reflect what we understand Manitobans value in energy planning, based on previous customer research and engagement.
- Metrics will assist in comparing plans in terms of their relative impacts across the metrics, also referred to as trade-offs.
- Metrics are quantitative such as costs or GHG emissions, but they can also be qualitative.

As we've stated earlier, given **Evaluation** is based on metrics, it is important to establish metrics at this stage.



So how will evaluation metrics be used? This slide shows is a high-level overview of the steps to arriving at a **recommended development plan**. The steps are shown in the red boxes. The grid graphic depicts how we start with dozens of development plans (represented by the small blue squares) and end up with a single recommended development plan (the lone green square in the rightmost graphic).

At the top, the first step covers the **modelling and sensitivity analysis**, where we expect to reduce the list of plans down to **handful of Potential development plans.**

The second red box is the **Evaluation** step. This involves broad assessment of strengths and weaknesses of the Potential development plans based on Manitobans' energy needs and priorities. In this step, potential development plans are evaluated and compared by assessing the trade-offs between metrics. This approach is an **engagement-informed assessment** that we will use to **short list** the potential development plans.

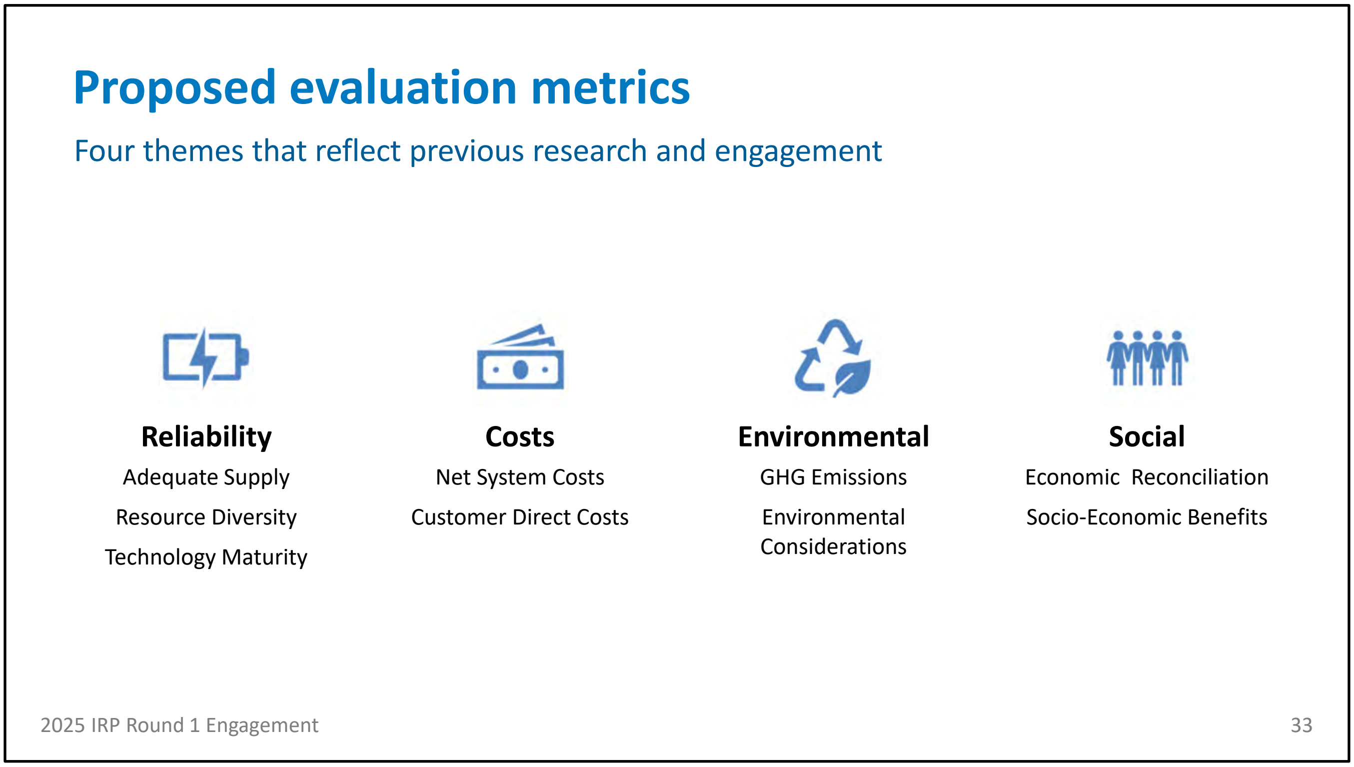
By way of example, suppose two plans – Option A and Option B, are very similar in terms of their level of reliability benefits and that Option A is modestly more costly than Option B, yet it has a lot more to offer in terms of environmental value. In this instance, Option A may be favoured over Option B, despite being modestly more costly.

Now we are at the middle red box, this is a deeper dive look at the short list of potential development plans using a comprehensive risk assessment, including identification of risk mitigations. This step will also include a conventional financial analysis to estimate what customer energy rates may be required to pay for the resources in the potential development plan.

The second last step involves **drafting the recommendation** to proceed with a **single Recommended Development plan**, represented by the green square.

Shown as the last step, we anticipate bringing a recommended development plan, along with other short list alternatives, to Round 2 Engagement in Spring 2025. We will also be coming back to you with **a long-term road map based on analysis out to 2050.**

By applying this methodology, we will arrive at a draft recommended development plan and roadmap that **integrates analysis and evaluation that is shaped by your input.**



We've reviewed what metrics are and how they will be applied. This slides highlights the proposed metrics, organized by value Theme.

We know from prior engagement that reliability and energy costs and are among the top concerns of most customers. Accordingly, we have proposed metrics grouped under these Themes.

Reliability refers to how to ensure the energy is available when you need it. We propose to assess this based on 3 metrics listed here and we will provide descriptions in the next slide.

Cost is another theme typically found in IRPs which addresses that our customers are impacted by costs including through rates and potentially through other direct costs to the customer.

We also understand that environmental, and social impacts are important to Manitobans, and they would like to see these values included in our energy planning.

Metrics under the **Environment** theme are intended to demonstrate how plans differ by GHG Emissions, as well as other environmental considerations.

Metrics under the **Social** theme will enable assessment of how plans may differ in terms of potential economic reconciliation opportunities and socio-economic benefits.

Proposed reliability evaluation metrics

Proposed descriptions

Adequate Supply: Ability for energy supply to meet future demand

- This metric will consider the ability to meet future energy needs at time of peak demand, and to ensure reliable operations during drought.

Resource Diversity: Potential to diversify resources in our existing systems

- This metric will compare how new resources can mitigate exposure related to any one specific resource (e.g., regulatory change, fuel supply risk, water supply variability)

Technology Maturity: Consideration of the risks and opportunities of various technologies

- This metric will compare the maturity, and consider the risks, of established technologies and emerging technologies.

2025 IRP Round 1 Engagement   Qualitative metric   Quantitative metric   34

We have proposed three metrics under the reliability Theme.

Just before we describe them, you will note the icons on the left indicate if we expect that the metric will be qualitative (i.e. a description) or quantitative (i.e. measurable using numbers).

Adequate supply refers to Manitoba Hydro's well established planning criteria where we will ensure there is sufficient supply to **meet peak demand typically during an extremely cold period in winter**, and enough energy to **maintain reliable operations even under severe drought conditions**.

Resource Diversity aims to measure how the Potential development plan **impacts the diversity of the resource mix**. This is intended to highlight where a diverse potential development plan may be **more robust to changes** that can affect the viability of any one type of resource.

Technology Maturity is another qualitative metric intended to address the fact that some resources are **well established and proven in commercial operation**, where there may be other resources that are **newer and may have greater uncertainty** related to construction cost or performance.

Proposed cost evaluation metrics

Proposed descriptions

Net System Costs: An estimate of the total costs to supply electricity and natural gas.

- This metric will be used to compare the need for revenue to cover total costs.
- This will be expressed as both a cumulative net present value and as an annual value.

Customer Direct Costs: An estimate of direct customer cost impacts.

- This metric will be used to compare the potential direct energy related incremental costs to customers as a result of a development plan, such as new appliances or heating systems needed.

2025 IRP Round 1 Engagement | Qualitative metric | Quantitative metric | 35

There are two proposed metrics in the Cost theme

Net System Costs is a metric that was used in the 2023 IRP and reflects capital and operating costs for new and existing resources (i.e., generation, supply, transmission, and distribution costs for both electricity and natural gas). This includes operating costs such as fuel costs for generation; water rentals; import costs; and customer natural gas costs. Export revenues are also accounted for, which is why this is called ***Net*** system costs.

This metric will be used to **compare the revenue needed to cover total costs** of a Potential Development plan.

Customer Direct Costs metric will be used to compare the potential direct energy costs to customers, such as new appliances or heating systems needed that are not apparent when presenting only Net System Costs.

Proposed environmental evaluation metrics

Proposed descriptions

GHG Emissions: An estimation of future greenhouse gas emissions

- This metric will be used to compare incremental emissions impacts between potential development plans.

Environmental Considerations: The potential effects on the environment

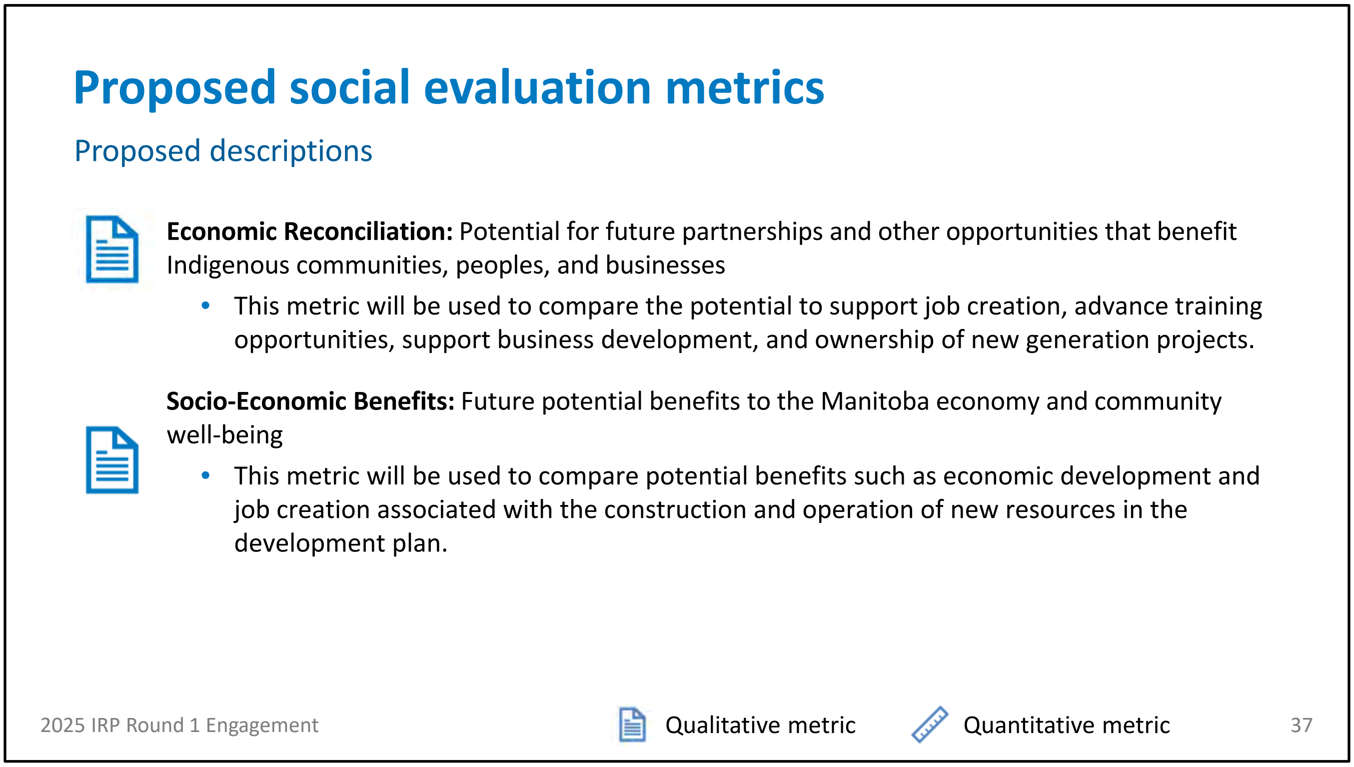
- This metric will help understand differences from a broad perspective and will include potential effects on the air, land, water, and people.

Qualitative metric   Quantitative metric

There are two proposed metrics under the Environmental theme

GHG Emissions is an estimation of the greenhouse gas emissions that will be produced in the future and will be used to **compare incremental emissions impacts** between potential development plans.

The Environmental Considerations metric is intended to highlight differences from a wider environmental view to compare potential effects on **the land, air, water, and people**. For example, what are potential changes to the land that can impact wildlife, or impacts on water that can affect fish. Development plans may also differ in their **potential affect on people's ability to exercise traditional and cultural practices**.



Social is the fourth theme, and here we are proposing two metrics.

Economic Reconciliation will be used to assess the **potential for future partnerships and other opportunities that benefit Indigenous communities and peoples**. That is, how would a potential development plan support job creation, training opportunities, business development, or Indigenous ownership of new generation projects.

Socio-Economic Benefits refers to potential future **benefits to the Manitoba economy and community well-being**. This metric will be used to compare potential benefits such as **new jobs created to construct and operate resources** associated in a Potential development plan.

We look forward to hearing your **feedback on these proposed Themes and evaluation metrics**.

Next Steps

Next Steps: shaping our energy future together

What's next?

We'll begin modelling, analysis, and evaluation soon.
Stay tuned for Round 2 Engagement in Spring 2025, where we'll seek your feedback on the preliminary development plan.

Let's talk about the future

Complete our survey by December 19, 2024: www.hydro.mb.ca/future
Questions or comments? Email us at: IRP@hydro.mb.ca

Thank you!

www.hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

Planning for our energy future

OUR 2025 INTEGRATED RESOURCE PLAN

Our Integrated Resource Plan (IRP) is a repeatable process used to understand and prepare for our province's future energy needs.

Energy – how it's made, how it's delivered, and how it's used – is changing.

The energy transition is already in Manitoba. Electricity demand in our province is growing, and Manitoba Hydro's supply is limited. It will take time to build new sources of generation and implement programs to reduce consumption. Our 2025 IRP will result in a development plan to ensure a safe, reliable, supply of electricity and natural gas, and leverage the opportunities presented by the energy transition.

OUR DEVELOPMENT PROCESS

Our 2025 IRP process will use the following steps and include input from customers, interested parties, and the Manitoba energy planning community.

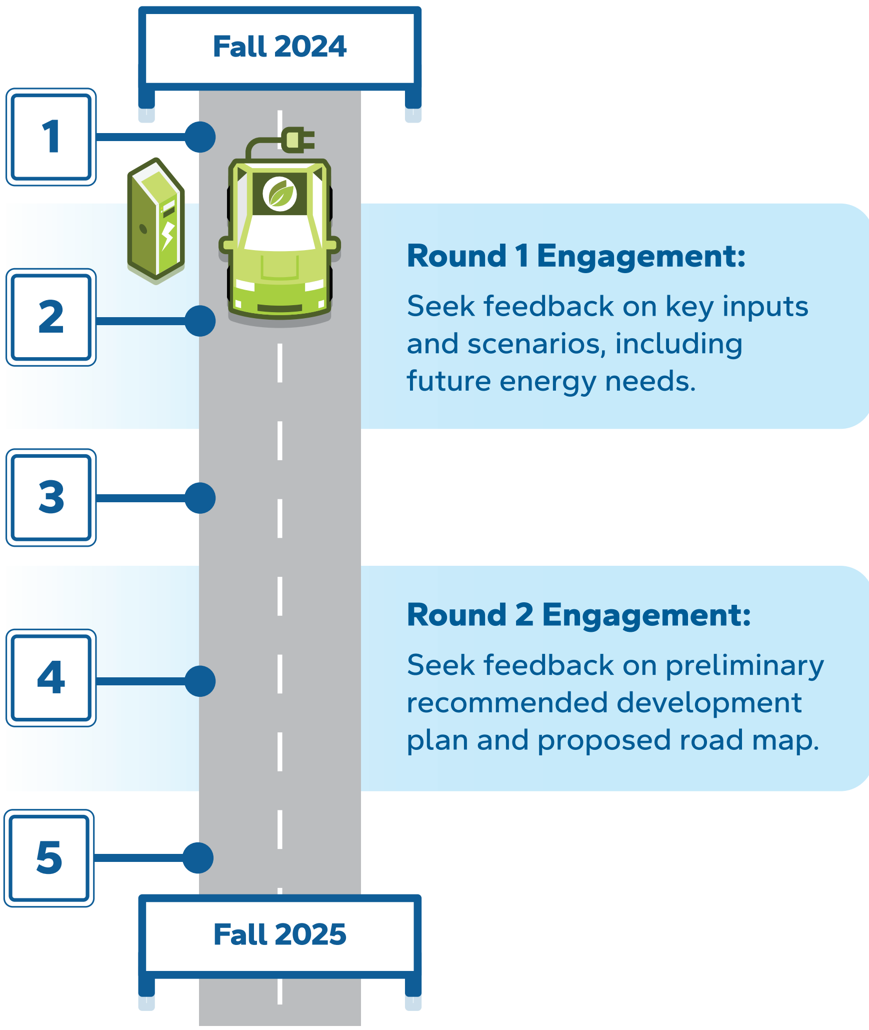
1. **Setting direction.** We set the direction of the 2025 IRP by identifying its purpose and what to include. This helps everyone understand what to expect.

2. **Develop key inputs and scenarios.** We gather information and data from a wide variety of sources to outline key inputs and develop scenarios used in the IRP. We also establish the evaluation metrics in this phase before we start our modelling and analysis.
   - **Key inputs** include load projections and resource options strategies. They have significant uncertainty and impact on the analysis. Planning assumptions that vary by scenario are included in these key inputs.
   - **Scenarios** represent an energy future. They are a likely combination of a specific load projection and resource option strategy.
   - **Evaluation metrics** are established to be applied to the modelling and analysis outputs.

3. **Modelling, analysis and evaluations.** Our experts use specialized computer models to test how Manitoba Hydro may serve future energy needs in the various scenarios. These modeling and analysis outputs let us know what may be needed for building new generation, managing peak demand, creating programs to reduce consumption, and delivering energy to our customers. We will compare and evaluate the modelling and analysis outputs to see how they align with Manitobans' energy needs.

4. **Preliminary recommendation.** From the evaluation of the modelling and analysis, we'll draft a preliminary recommended development plan for meeting the needs of our customers for years to come. We will share and seek feedback on this draft plan and proposed road map outlining what actions are needed now to prepare for the energy future.

5. **Finalize the Integrated Resource Plan.** After reviewing feedback, we'll finalize the recommended development plan and road map, and publish the IRP in Fall 2025.



Manitoba Hydro can't take these steps alone. We are continuing to work together with Manitobans and the energy planning community to navigate the energy transition, with opportunities to provide feedback at various stages throughout the development of our 2025 IRP.

Curious about the energy future, the factors influencing the energy transition, or Manitoba Hydro's Integrated Resource Plan? Visit **hydro.mb.ca/future** to learn more and to subscribe to our mailing list to follow along for updates and to share your feedback as we develop the 2025 IRP.

Let's talk about our energy future.

Hearing from you helps us better understand your changing needs and priorities.

hydro.mb.ca/future

Manitoba Hydro
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Key Inputs and Scenarios

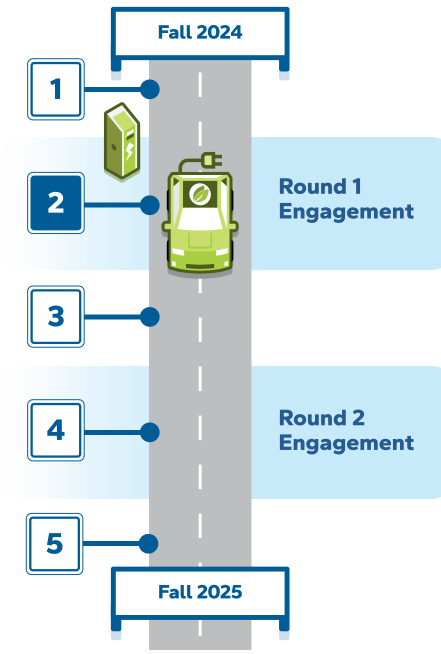
ABOUT THE 2025 INTEGRATED RESOURCE PLAN

The energy transition has begun in Manitoba. How energy is made, how it's delivered, and how it's used are changing. We've started to develop our 2025 Integrated Resource Plan (IRP) — a repeatable process that helps us prepare for the energy world of tomorrow.

Key inputs and scenarios: step 2 of our 2025 IRP development process

The second step in our 2025 IRP development process is to determine the key inputs and scenarios in our analysis. Key inputs include load projections and resource options strategies, which have significant uncertainty impact on the analysis. Planning assumptions underpin the development of the key inputs and the scenarios.

Scenarios represent specific energy futures. Each scenario is a likely combination of a load projection and a resource options strategy.



LOAD PROJECTIONS

- Anticipated electrical demand and natural gas demand.
- Based on planning assumptions.

RESOURCE OPTIONS STRATEGIES

- Represents potential policy impacts that limit what resources can serve future demand.
- Based on planning assumptions.

SCENARIOS

- Represents a specific energy future.
- It is a likely combination of a Load Projection and a Resource Options Strategy.

KEY INPUTS

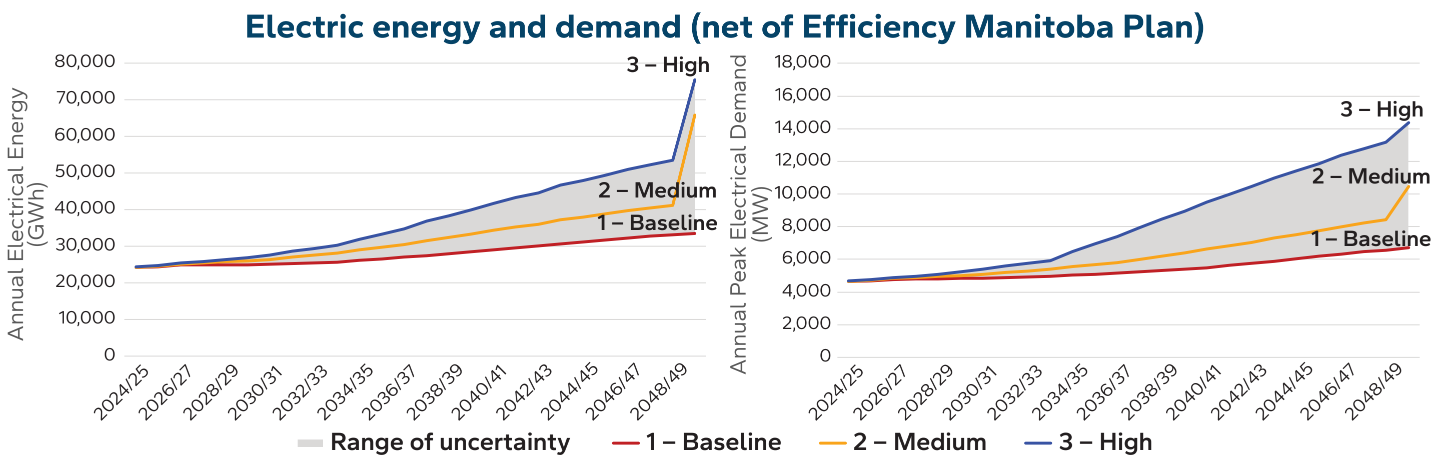
To request accessible formats visit hydro.mb.ca/accessibility.

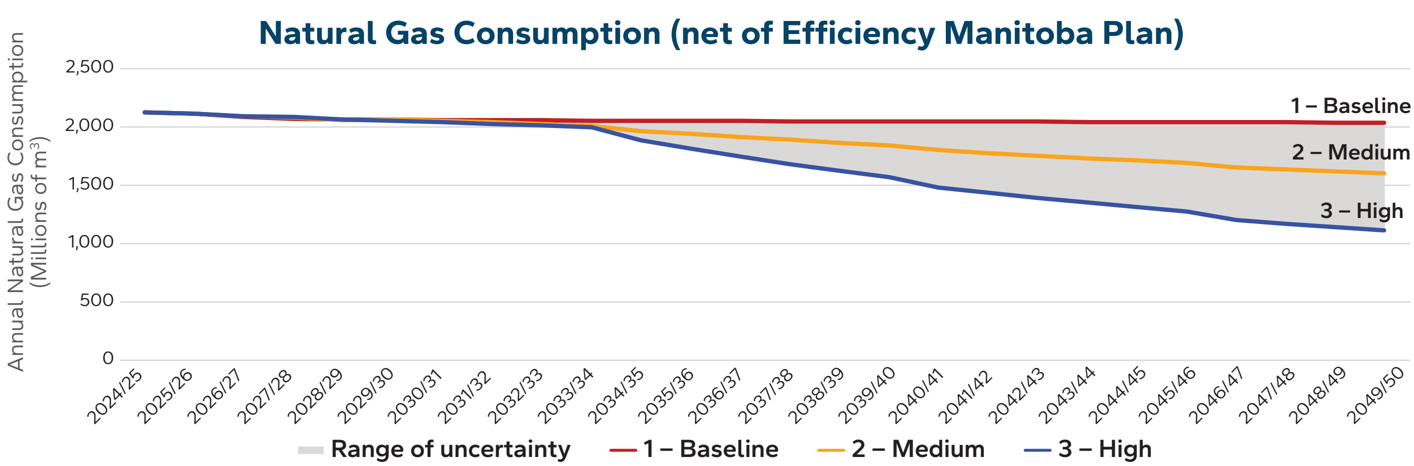
Manitoba Hydro energy for life

Key Inputs

LOAD PROJECTIONS

Load projections represent future energy demand of natural gas and electricity that Manitoba Hydro might have to supply. The load projections in our IRP are influenced by how Manitobans might achieve a net-zero economy by 2050. To address the range of uncertainty surrounding the amount and pace of change to both electric and natural gas consumption, we developed three load projections from now to 2050. These load projections will explore different combinations of potential policy and customer decisions. Load projections vary due to assumptions and uncertainty surrounding inputs like economic growth, space heating, electrification of transportation, energy efficiency, and decarbonization, and are common between the electric and natural gas load projections.





Key Inputs

RESOURCE OPTIONS STRATEGIES

Resource options strategies reflect the potential resources available to meet those demands. Four resource options strategies are used to reflect assumptions on policy and its potential to impact resources available for selection. These range from a technology neutral strategy (current policy) to a progressively more restrictive strategy with no fossil fuel-based resources.

Resource Options Strategies	Assumptions
A – Technology Neutral	Compliant with federal Clean Electricity Regulations.
B – Net-Zero Grid 2035	Strategy A, plus requirement that electricity grid is net-zero by 2035.
C – Near Term Wind Generation Projects	Strategy B, plus up to 600 MW of Indigenous majority owned wind with dispatchable resources for reliability.
D – No Fossil Fuel-Based Resources	Strategy B, plus requirement of no fossil fuel-based combustion turbines post 2035 (i.e. no natural gas generation).

Manitoba Hydro keeps an inventory of resource options to meet future energy needs. These resource options can include building new generation, like wind turbines, and/or creating programs to promote reducing consumption, like energy efficiency programs. Each resource has different characteristics, like costs, emissions, dispatchability, maturity, and in-service dates. The resource options strategies narrow the available resources from this full inventory.

SCENARIOS

Combining a load projection with a resource options strategy results in a scenario. Eight scenarios will be analyzed, where Scenario 1A and 3D are bookends. Scenario 1A has the least restrictive energy policy and Scenario 3D has the most restrictive energy policy. The scenarios represent a reasonable range of possible energy futures in Manitoba, so unlikely combinations will not be studied.

Resource Options Strategies	1 – Baseline Load Projection	2 – Medium Load Projection	3 – High Load Projection
A – Technology Neutral	Scenario 1A	-	-
B – Net-Zero Grid 2035	Scenario 1B	Scenario 2B	Scenario 3B
C – Near Term Wind Generation Projects	Scenario 1C	Scenario 2C	Scenario 3C
D – No Fossil Fuel-Based Resources	-	-	Scenario 3D

SENSITIVITIES

Sensitivity analysis, or "What-if" analysis, tests how a change to one planning assumption impacts the results. Sensitivities can include adjustments to energy market prices, capital costs, resource option lead times, or further resource option restrictions. Sensitivity analysis provides additional information for evaluating potential development plans.

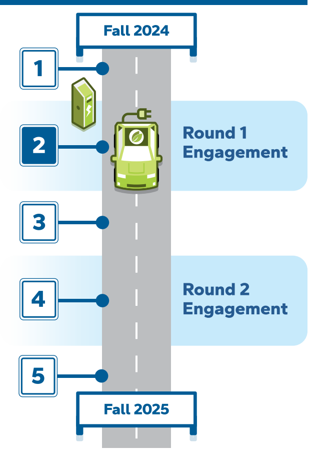
Evaluation metrics

ABOUT THE 2025 INTEGRATED RESOURCE PLAN

The Integrated Resource Plan (IRP) is a repeatable process used to understand and prepare for the energy future in Manitoba. Our 2025 IRP will result in a road map that will include a recommended development plan.

A new step in our IRP development process

Manitoba Hydro is enhancing our evaluation metrics for 2025 IRP. The evaluation metrics will help compare and assess trade-offs between potential development plans and will help shape a development plan that addresses evolving customer needs and priorities. We establish the evaluation metrics in Step 2: Key Inputs and Scenarios of our IRP development process, so we can make sure the modelling and analysis is designed to output the necessary information to complete the evaluation.



EVALUATION METRICS

Four themes have been established for the 2025 IRP: reliability, costs, environmental, and socio-economic. The evaluation metrics in these themes will help assess potential trade-offs between potential development plans.

Some explanation of these themes:

- **Reliability:** Reliability means ensuring energy is available when needed by focusing on adequate supply, resource diversity, and technology maturity.
- **Costs:** Costs means understanding the impacts on net system costs and direct-to-customer costs throughout the energy transition as a result of a potential development plan.
- **Environmental:** Environmental means addressing how potential development plans differ by greenhouse gas (GHG) emission levels and other environmental considerations, such as effects on air, land, water and people.
- **Socio-economic:** Considering socio-economic impacts means assessing economic opportunity and economic reconciliation to ensure potential opportunities for all Manitobans as a result of the potential development plan.

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2.5. IP Round 1 Participation Summary

Participants	Date	Attendance
Interested Parties	November 14, 2024	14
Interested Parties	November 18, 2024	18
Interested Parties	November 28, 2024	18
Government of Manitoba Departments	December 4, 2024	26
TOTAL		**76**

Indigenous Nations, municipalities, and interested parties represented at Interested Parties Sessions:

Acorn Hill Partners Inc.
Assiniboine Community College
Bioscience Association of Manitoba
Business Council of Manitoba
Canadian Fuels Association
Canadian Gas Association
Canadian Manufacturers and Exporters
City of Brandon
City of Selkirk
City of Thompson
City of Winnipeg
Eco-West / Eco-Ouest
Efficiency Manitoba
Electranix
Green Action Centre
Indigenous Chamber of Commerce
International Institute of Sustainable Development
Keystone Agricultural Producers
Manitoba Eco-Network
Manitoba Energy Justice Coalition
Manitoba Environmental Industries Association
Manitoba Home Builders' Association & Urban Development Institute
Manitoba Industrial Power Users Group
Manitoba Institute of Trades and Technology
Manitoba Motor Dealers Association
Manitoba Sustainable Energy Association
Mechanical Contractors Association of Manitoba
Red River College Polytechnic
Rural Manitoba Economic Development Corp.
Stantec Consulting Ltd.
Sustainable Building Manitoba

Switch Energy
Trane
University of Winnipeg
Vehicle Technology Centre Institute
Winnipeg Economic Development and Tourism

2.6. IP Round 1 What We Heard Summary

Round 1
Engagement Summary

In our most recent engagement with Manitobans as part of developing the 2025 Integrated Resource Plan (IRP), we asked for feedback from our customers and interested parties to understand their perspectives and their potential future energy needs. The following is a summary of what we're hearing and how it is informing our process.

How we're listening

Our first round engagement took place between November 2024 – January 2025 and included workshops, meetings, interviews and surveys conducted with Manitobans with a wide range of perspectives and living situations. We also created a Technical Advisory Committee to bring together diverse perspectives from representative groups across Manitoba to delve into more detail on topics related to long-term energy planning.

Customer Survey	Project Newsletter	Customer Insights	Interested Parties	Technical Advisory Committee
6800	**8700**	**58**	**4**	**4**
Responses	Subscribers	Surveys & Interviews Various Customer Sectors	Virtual Workshops	Meetings

We're continuing to hold conversations with Manitobans on the 2025 IRP. Our second round of engagement begins in Spring 2025, and a full engagement report will come with publication of the IRP in Fall 2025.

What we asked

We asked questions in Round 1 engagement to seek feedback on:

- The key inputs and scenarios to be explored in the 2025 IRP. This includes future energy needs of customers, along with the choices they might make, to better understand how energy demand might grow over time.
- What factors might be important to consider when evaluating our energy planning.

What we're hearing & how we are incorporating feedback

Engagement on our energy future generates important dialogue and gathers diverse feedback from various audiences. While not all feedback is directly related to the IRP every piece of input is valued. We review all feedback and consider this feedback for our 2025 IRP or for other Manitoba Hydro activities, such as ongoing energy planning completed outside of the IRP.

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We asked for feedback on:

PROPOSED LOAD PROJECTIONS

Three proposed load projections were developed to evaluate a broad range of future electricity and natural gas demand to the year 2050. These included load projections to achieve a net-zero economy by 2050.

What we heard:

- Uncertainty about Manitoba Hydro's role in a net-zero economy and relationship to other provincial policy.
- Load projections should consider what is required to achieve zero emissions from the transportation and space heating sectors by 2050.
- Economic development, in particular the mining sector, has significant potential to influence load projections and it was suggested that the baseline load projection may be underrepresenting this impact.
- Concerns about the reliance on Direct Air Capture in 2049/50 to achieve a net-zero economy.
- Demand response planning assumptions should have a higher anticipated impact.

What we did with this feedback:

- Feedback confirmed the three load projections reflected broad range of potential energy needs in Manitoba.
- We will include analysis to understand how energy demands might change if ground transportation and space heating produce no greenhouse gas emissions by 2050 (i.e. they achieve absolute zero).
- Feedback on assumptions related to the impact of economic development and concerns related to relying on Direct Air Capture are already considered through the planned modelling and analysis, so no changes are needed.
- We adjusted the planning assumptions graphic to more accurately represent that demand response is being maximized in every load projection.

Other feedback heard helped confirm expectations about future energy demand:

Customers shared future energy choices they are considering which can give an indication of how energy demands might grow over time:

- Residential customers identified several energy choices they are considering, including showing an interest in tracking and managing their energy use through smart home devices. More customers are thinking about buying electric vehicles and upgrading home charging capabilities. There is also a growing interest in installing solar panels with some considering battery storage. Interest in heat pumps is slowly increasing, while customers are slow to plan a switch from gas space heating to electric.
- Communities shared energy goals including a focus on self-generation opportunities (solar/wind) including energy storage, energy efficiency upgrades, fleet electrification and charging infrastructure, and supporting policy and by-law changes.
- Large industrial customers expect to use more electricity in the future. More businesses are monitoring emerging and mature technologies and developing plans to decarbonize through electrification, including assessing feasibility of fleet electrification.

RESOURCE OPTIONS STRATEGIES

Four resource options strategies were proposed to reflect policy assumptions that increase the impact of what generation resource options may be available to serve future energy demand.

What we heard:

- Strategy assumptions that eliminate all fuel-based generation resource options (such as hydrogen and biomass) are not reflective of realistic policy and could over restrict the analysis.
- Allowing fossil fuel generation for extreme circumstances is an acceptable assumption.
- Participants requested clarification on the resource options inventory, including:
  - How energy storage is being considered as a resource option.
  - The difference between the terminology 'energy' and 'capacity'.
  - How resource options costs are being considered.
  - How exports come into play in determination of capacity and energy need dates.

What we did with this feedback:

- We revised the resource options strategies to allow the use of hydrogen, biomethane, and biomass fuels for electricity generation (i.e., only restrict the use of fossil fuels in non-extreme circumstances).
- To address the detailed questions related to the resource options inventory, an additional meeting was scheduled with the Technical Advisory Committee.

SCENARIOS & SENSITIVITIES

Eight scenarios were proposed where each represents a specific energy future to study in the 2025 IRP. In addition to the scenarios, sensitivities are proposed to help us understand how changes in an assumption or constraint may impact our results.

What we heard:

- Concurrence that only modelling the most likely scenarios was an acceptable strategy.
- Some participants suggested considering other scenarios and sensitivity analysis, including:
  - Energy market prices
  - Technology/equipment availability
  - Behavioural changes
  - Operation cost impacts
  - Overbuilding of resources
  - Operations and maintenance levels

What we did with this feedback:

- Feedback confirmed the eight proposed scenarios.
- We added a sensitivity to study the impacts of further restrictions on resource options excluding the ability to use hydrogen, biomethane, and biomass fuels for electricity generation.
- Some of the suggestions will be considered for ongoing energy planning because they are out of scope for the 2025 IRP.
- Other suggestions would already be captured through planned modelling and analysis, including planned sensitivities, so no changes are needed.

EVALUATION THEMES & METRICS

What we heard:

- The appropriate evaluation themes and metrics were included.
- Reliability is consistently rated the most important factor in energy planning and energy planning must balance factors related to costs, environment, and social impacts. This includes focusing on replacing aging infrastructure while also building to accommodate future growth and development.
- How the themes will be weighted against each other is important and requires further clarification.
- Importance of considering past impacts in the evaluation metrics.
- Reconciliation is a multifaceted journey that includes acknowledging and addressing past harms on Indigenous Peoples and takes into consideration much more than social impacts.
- Economic reconciliation is appropriate, however it should be considered as its own value theme as part of the future development plan evaluation process.
- The social value theme could be reframed to socio-economic to reflect the economic based metrics.
- Clarification is needed to detail if the evaluation will consider the integration of all systems (generation, transmission, distribution, gas).
- Some participants suggested additional evaluation measures:
  - Energy intensity
  - Health and wellness benefits and/or risks
  - Reliability of the transmission and distribution system
  - Climate change impacts to water supply and energy demand
  - Reliance on HVDC and energy security when evaluating for resource diversity
  - Embodied carbon, or life cycle emissions
  - Mitigation strategies required due to environmental impacts
  - The cost of doing nothing

What we did with this feedback:

- We have reframed the social theme to socio-economic based on engagement feedback.
- We will use the feedback shared to make the evaluation metric descriptions clearer, so its easier to understand the details and considerations for each one.
- We will incorporate the feedback shared on trade-offs between the evaluation metrics when applying them to the potential development plans.
- Some suggestions, such as energy intensity, will be considered for future energy planning, as we do not currently have the data and methodology to complete for the 2025 IRP.
- Other suggestions would already be captured through planned modelling and analysis, including planned sensitivities, so no changes are needed.

Other feedback that does not directly impact the 2025 IRP, but will be considered in ongoing energy planning or shared with relevant teams at Manitoba Hydro:

- It was noted that the geographic location/regional differences should be considered as unique individual, community, municipal or cultural perspectives differ across Manitoba.
- Many communities shared that system reliability and enhancements to minimize outages is important, especially in rural and northern Manitoba.
- Communities expressed a need for more energy related information and resources, with many expressing a desire to continue to engage and work in partnership with Manitoba Hydro to plan for future needs.

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2.7. IP Round 1 Questions and Answers Summary

Round 1
Questions and Answers

The following are responses to questions received throughout Round 1 conversations in our 2025 Integrated Resource Planning Process.

Climate Risk

This section focuses on questions related to climate change or climate risk.

How are projected climate change impacts considered in the IRP?

Climate change has the potential to impact Manitoba Hydro through its effect on the water supply used for generating hydropower and through its effect on demand for capacity and energy. As part of the 2023 IRP, a sensitivity analysis explored a range of potential impacts of climate change on the selection of resources, greenhouse gas emissions, and costs (See page 68 2023 IRP Appendix 5 – Analysis Results).

The 2025 IRP will include a climate change sensitivity as it relates to water flow conditions. As a result of the 2023 IRP analysis findings, climate change impacts on the load projections are expected to be modest and have not been included within the load assumptions for 2025 IRP.

Greenhouse Gas Emissions & Net-Zero

This section focuses on questions asked about greenhouse gas emissions, including how net-zero is considered within the IRP.

Many communities have energy and emissions plans. Can these plans be incorporated?

Manitoba Hydro is continually working to understand community planning initiatives and how these may impact the energy needs of Manitoba. These energy needs are incorporated into the 2025 IRP analysis.

What does net-zero mean?

Net-zero refers to a state where some greenhouse gas emissions (GHGs) will continue to be emitted, but these emissions are balanced by removing the same amount of GHGs from the atmosphere. For further information on GHGs, please see Manitoba Hydro's GHG web page.

To request accessible formats visit hydro.mb.ca/accessibility.

Why is it assumed that emitting systems that are operational and not at end-of-life would be permissible under net-zero requirements?

It is possible to meet net-zero emission targets while continuing to operate emitting systems by offsetting those emissions. The 2025 IRP aligns with the Federal Government's Clean Electricity Regulations, which set limits for emitting resources and require all emissions to be offset beginning in 2050.

Is it reasonable to assume that direct air carbon capture will be able to account for any remaining emissions in the late 2040s to meet net-zero by 2050, rather than relying on other means earlier and reducing emissions more gradually over the 2025 IRP study period?

Achieving a net-zero economy in Manitoba requires deep reductions in the use of fossil fuels and substantial reductions in other non-fossil fuel related GHGs. It is expected that negative greenhouse gas emission technologies will be needed to offset any remaining emissions (such as agricultural and fugitive emissions) in Manitoba that cannot be removed by 2050. An example of a negative greenhouse gas emission technology (i.e., GHG removal) is direct air carbon capture and storage; these technologies are expected to have a large electrical load.

For the purposes of the 2025 IRP analysis, the characteristics of direct air carbon capture and storage are used to model the electrical load of negative emission technology. Due to high costs associated with building, operating, and powering direct air capture and storage technology, it was assumed that this technology would only begin operation as we approach the 2050 target of a net-zero economy.

Electric Vehicles (EVs)

This section focuses on questions related to the electrification of transportation.

How do overall transportation mode shifts play a role beyond electrifying vehicles? What are the indicators for these types of shifts in transportation, for example taking a bus vs. taking a car?

The 2025 IRP does not factor transportation modal shifts into the planning assumptions of the load projections. This is something we continue to actively monitor through key indicators such as vehicle registrations and sales trends across vehicle categories (light, medium, heavy duty and buses). We also track government actions, such as the Federal Government's 'Electric Vehicle Availability Standard,' which mandates progressively higher sales of zero-emission vehicles (ZEVs) — including battery electric vehicles, plug-in hybrids, and hydrogen fuel cell vehicles — as a percentage of total sales.

In Manitoba, electric bikes are included in the overall energy consumption for off-road vehicles. However, we do not explicitly highlight electric bikes as part of planning assumptions in the 2025 IRP as the electricity demand of an electric bike is significantly less than that of an electric vehicle.

We report on these trends in our Signpost Updates.

Evaluation Metrics

This section focuses on questions related to the evaluation process within the IRP.

Are there different weightings allocated to each evaluation metric? Or are they equally weighted?

Through engagement, we asked customers and interested parties what factors are important to consider in energy planning. The feedback heard will help us understand how the different trade offs between the evaluation metrics, or the different weightings of the evaluation metric, will have to be considered.

Import & Exports

This section focuses on questions related to energy market assumptions within the IRP.

Does the IRP assume Manitoba Hydro will continue to export power, or that power exports will become undesirable or prohibited?

Manitoba Hydro intends to fulfill all of its current obligations under firm long-term export contracts.

The 2025 IRP assumes no new future long-term firm (capacity or energy) export contracts and that existing long-term firm export contracts will not be renewed when they expire as that capacity and energy is required for Manitoba load.

Wholesale trading of electricity is expected to continue to be an important aspect of power system operations. The 2025 IRP assumes that when Manitoba Hydro has surplus energy, it will be offered to the short-term opportunity export market and that imports are available to provide a dependable supply of energy for use during low water conditions.

As directed by the Province of Manitoba, Manitoba Hydro is reviewing all export sales to the United States and will seek approval of the Lieutenant Governor in Council to enter into any new major power purchase or export sale contracts, or extend such contracts, with any party in the United States.

Integrated Resource Plan

This section focuses on questions related to the scope and purpose of the Integrated Resource Plan. Learn more about our 2025 Integrated Resource Plan process.

What is an Integrated Resource Plan?

An Integrated Resource Plan (IRP) is a tool that utilities use to understand and prepare for future energy needs. Developing an IRP is a repeatable process. The IRP can be updated as future conditions evolve. For Manitoba Hydro, it accounts for both our electricity and natural gas systems and reflects combinations of customer needs, service territory, the energy products offered to customers, existing assets, and policy drivers. A key part of an IRP is that it includes engagement with customers and interested parties as part of its development to ensure openness and transparency in the energy planning process.

Why is Manitoba Hydro developing a new Integrated Resource Plan so soon after that last one in 2023?

Manitoba Hydro is responsible for supplying Manitobans with safe and reliable energy. The energy transition, and particularly decarbonization, is increasing demand for electricity — and Manitoba Hydro's supply is

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limited. Since the last IRP – the 2023 IRP – Manitoba Hydro's ongoing analysis shows that new capacity supply could be needed as early as 2029/30.

The 2025 Integrated Resource Plan will include a recommended development plan that will outline a series of specific actions Manitoba Hydro can take to meet future energy needs. Manitoba Hydro has a legislated requirement through the Province of Manitoba's *Manitoba Hydro Act* to develop an IRP, informed through engagement, to identify the proposed development of any major new facility.

Load Projections

This section focuses on questions related to the three proposed load projections which were developed to evaluate a broad range of future electricity and natural gas demand up to the year 2050.

Are the different load projections considering diverse geographical locations and differences among demographics?

We have developed zonal forecasts which breaks down the Manitoba aggregate load into six zones across the province, but the IRP maintains a province-wide, holistic view. Simply stated, we do not consider diverse geographical location differences within the IRP.

How does population growth/population change fit into the model?

Each of the scenarios establishes a certain estimate of the growth of the provincial population which influences load.

Policy

This section focuses on questions related to policy considerations within the IRP.

Will the 2025 IRP be aligned with the Province of Manitoba's Affordable Energy Plan?

An IRP accounts for existing and highly anticipated policy from all levels of government, including federal, provincial, and municipal. This includes the Government of Manitoba's Affordable Energy Plan.

Rates

This section focuses on questions related to how rate impacts are considered within the IRP.

You say managing the energy future will mean making investments. How much could electricity rates increase?

Ultimately, rates are set according to orders from our regulator, the Public Utilities Board through a process separate from the IRP. The 2025 IRP provides analysis that will determine what investments will be needed, which will inform future rate setting processes and will likely be just one input into the regulatory rate-setting process.

Reconciliation

This section focuses on questions related to how reconciliation is considered within the IRP process.

Does the 2025 IRP go beyond economic considerations and look at other aspects such as economic reconciliation? How does reconciliation fit into the IRP modelling process?

Manitoba Hydro is committed to respecting and supporting Indigenous peoples in all aspects of our business. We support the advancement of reconciliation with Indigenous peoples in Manitoba.

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The evaluation metrics will include themes of reliability, cost, environmental, and socio-economic considerations in the recommended development plan. Economic reconciliation is considered as part of this process.

For further information on Manitoba Hydro's Indigenous Relations, please see the Indigenous Relations webpage.

Resource Options

This section focuses on questions related to specific resource options used by Manitoba Hydro today or considered to meet future energy needs. The resource options inventory for the 2025 IRP can be found on Page 26.

How does Manitoba Hydro decide what resources to consider for meeting future energy needs?

Manitoba Hydro actively monitors and maintains an inventory of resource options that have a high potential to meet Manitoba's future electricity needs and help reduce peak demand. Each resource option has specific characteristics that contribute to the resource options' capability to potentially serve future demand.

Energy Efficiency & Efficiency Manitoba Programs

How are Efficiency Manitoba's targets and programs built into the model? Are investments in energy efficiency considered as an alternative to new generation?

Electricity and natural gas savings achieved through Efficiency Manitoba's programming is being considered in two ways in the 2025 IRP. Efficiency Manitoba provided Manitoba Hydro with a long-term projection of electric and natural gas savings, based on its current Energy Efficiency Plan to achieve their legislated targets. This forecast of electric and natural gas savings was subtracted from the load forecasts of all IRP scenarios. Efficiency Manitoba also identified the energy efficiency groupings it could focus on to advance or achieve more energy savings than identified in its long-term projection of savings. This extra energy efficiency potential was estimated based on a market potential study. In select sensitivities, the model can select these extra energy efficiency groupings along-side other resource options.

Hydrogeneration

Does this 2025 IRP mean Manitoba Hydro is looking to build Conawapa or exploring other hydroelectric development?

There is no current plan or decision to build Conawapa. Our resource options inventory includes numerous potential resource options to meet future needs, including Conawapa and other potential hydroelectric development sites such as Notigi.

Hydrogen

Is it always assumed that the hydrogen will be created using renewable energy sources (i.e. it will be green hydrogen and not gray/blue hydrogen)?

Any new hydrogen in the 2025 IRP analysis is assumed to be generated locally in Manitoba using electrolysis.

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Imports & Exports

How are electricity imports treated as a resource option?

Imports from other jurisdictions over existing transmission lines are a potential resource option available to meet capacity requirements. Manitoba Hydro currently has interconnections to our neighbours in Canada and the United States (U.S.), providing energy and capacity. Depending on evolving market conditions, Manitoba Hydro could import electricity to meet short-term capacity needs in the future. In the 2025 IRP, new firm-capacity import transactions are included in the resource options inventory as selectable up to 50 MW per year based on a 5-year commitment.

As directed by the Province of Manitoba, Manitoba Hydro will seek approval of the Lieutenant Governor in Council to enter into any new major power purchase contracts, or extend such contracts, with any party in the United States.

Natural Gas

How does natural gas support the reliability of Manitoba Hydro's electricity grid?

One way that natural gas supports the electrical system is by serving some of Manitoba Hydro's energy needs that would otherwise need to be served through the electricity system. Natural gas is the main heating source for 60% of homes in the province. On the coldest days in winter, natural gas provides the equivalent of 1.4 times the capacity of our existing electrical system. The natural gas system also has long duration storage to support prolonged cold snaps.

Natural gas is also used to generate electricity and support the primary sources of electricity generation (97% hydrogenation and 3% wind generation). In these cases, natural gas electricity generation is used strategically to ensure reliability in our electricity generation system in certain conditions, such as: to meet capacity needs when electricity demands are especially high (like on the coldest days of winter); when we are experiencing low water conditions or the wind is not blowing; and, in case of emergencies affecting generating stations or the transmission system.

Does the 2025 IRP look at ways that Manitoba Hydro can reduce natural gas?

The 2025 IRP includes analysis to meet the Province of Manitoba's objectives of a net-zero economy in 2050. Meeting this objective will likely include reductions in natural gas demand in Manitoba.

Solar

Why doesn't Manitoba Hydro invest in utility-scale solar?

Solar is included in the resource options inventory for the IRP. In Manitoba, solar generation does not provide firm (i.e. consistent, dependable) electrical capacity during our winter peak times, which limits its value as a utility-scale resource to serve Manitoba's needs.

Social Considerations

This section focuses on questions related to how social and cultural aspects are considered in the IRP.

Are cultural and social considerations such as consumer uptake and buy-in, as well as customer expectations, built into the modelling and analysis?

Yes. Anticipated changes in consumer behaviour, such as the impact of incentives that affect the uptake of new self-generation technologies or electric vehicles, are considered in the assumptions used to develop the load projections.

Technology

This section focuses on questions related to changes in technology.

How is Manitoba Hydro going to be agile enough to move with technology when it is changing so quickly?

The IRP is updated regularly given the pace of change and so it can consider evolving technologies as they mature. Through monitoring of what we call signposts, we keep updated on things like technology & market changes to ensure timely and informed outcomes.

Links

- 2023 IRP Appendix 5 – Analysis Results (climate risk – page 68) www.hydro.mb.ca/docs/corporate/irp/irp-2023-a5-analysis-results.pdf
- Manitoba Hydro's GHG web page www.hydro.mb.ca/environment/greenhouse-gas/
- Signpost Updates www.hydro.mb.ca/docs/corporate/irp/2023-irp-signpost-update-en.pdf
- 2025 Integrated Resource Plan process www.hydro.mb.ca/docs/corporate/irp/2025-irp-process-overview-en.pdf
- *Manitoba Hydro Act* web2.gov.mb.ca/laws/statutes/ccsm/h190.php#38.1
- Rates www.hydro.mb.ca/account/billing/rates/
- Indigenous Relations www.hydro.mb.ca/community/indigenous-relations/
- Resource options inventory (page 26) www.hydro.mb.ca/docs/corporate/irp/2025-irp-round-1-presentation-122024.pdf

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2.8. IP Mid-Project Information Session Presentation and Handouts

This section includes the following materials:

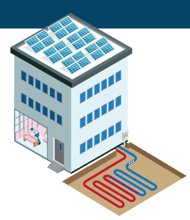
- Information Handout: *Six resource options available for development plans to 2035*
- Presentation: Project Information Session
- Presentation Transcript: Project Information Session

Six resource options available for development plans to 2035

Efficiency Manitoba base plan:

In Manitoba, Efficiency Manitoba is a Crown corporation tasked with providing energy efficiency programs. Their base plan is based on legislated targets and includes projected energy savings from Efficiency Manitoba's 2025–28 planning analysis extended out to 2050. Energy efficiency means using less energy to lower consumption, which reduces or delays the need for new resources. It helps lower electricity and/or natural gas usage, which is especially important during winter months when demand for electricity is at its highest.

Additional energy efficiency programs:

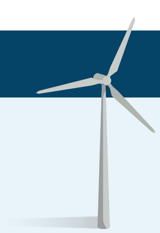


There are three categories included in this section:

1. **Additional programs** - above and beyond the Base Efficiency Manitoba plan. Examples include programs for commercial ground source heat pumps, or installation of an electric furnace with thermal energy storage.

2. **Demand Response** - is a portfolio of programs and technologies that encourage a shift in energy use away from times of high demand to times of lower demand. Manitoba Hydro is currently exploring opt-in Demand Response options in partnership with Efficiency Manitoba.

3. **Curtailable Rate Program** - The Curtailable Rate Program (CRP) provides Manitoba Hydro with curtailable load as a resource to meet energy and reliability requirements. The CRP provides participating customers, typically large industrial companies, with a bill discount in exchange for agreeing to reduce their electricity demand when requested by the utility.



Wind generation:

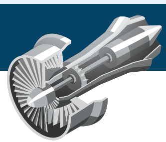
Wind generation is a renewable energy resource that relies on wind to generate electricity. The force of wind rotates large blades connected to a generator, spinning the generator and producing electricity. The larger the blades and the higher the wind speeds, the more wind energy is produced. The amount of wind varies throughout the province making some locations better suited for wind generation than others. Wind is a variable resource that cannot be solely relied upon to meet peak demand.

Utility scale battery storage (short-term):

Utility scale battery storage is a resource that uses lithium-ion technology to store energy to use when needed. Battery storage can quickly respond to electricity needs but typically has limited storage capacity—around 4 to 6 hours of electricity before needing to be recharged. Batteries can have a smaller footprint compared to other alternatives, which means they can be developed at a range of locations. In comparison to other resource options, batteries have relatively short asset lives of approximately 15 years.

Enhancements to existing hydropower:

Hydropower generation uses the flow of water down an elevation to spin a turbine and generator to produce electricity. Nearly all the electricity we produce is generated at 16 hydroelectric generating stations on the Nelson, Winnipeg, Saskatchewan, Burntwood and Laurie Rivers. Upgrades and enhancements to existing generating stations primarily result in additional capacity to help meet demand, but also provide limited energy in some cases. For example, Manitoba Hydro's Pointe du Bois Renewable Energy Project involves replacing the original generating units at the over 100-year-old station with larger generating units to restore its capacity to rated levels and increase its overall generation output. There is potential for enhancements at other stations in Manitoba Hydro's portfolio.



Natural gas/biomethane fuelled combustion turbines:

Combustion turbines (CTs) use an internal combustion engine to generate electricity. These internal combustion engines involve compressing air into a combustion chamber, where the air is mixed with a fuel source (like natural gas, hydrogen, or alternative fuels) and ignited. The ignition expands the air, which is then forced onto turbine blades, causing the turbine to rotate, which in turn rotates a shaft connected to a generator. This spinning motion generates electricity. Combustion turbines are a flexible, dispatchable resource that provides both capacity and energy when needed and are able to meet a wide variety of system needs. Combustion turbines are typically used as a backstop for other generation resources, such as complementing variable resources like wind. In Manitoba Hydro's modelling, they are most often selected with natural gas as a fuel source—but many CTs can be adapted to use alternative or emerging fuel sources should those sources become advantageous. Combustion turbines fuelled by natural gas emit greenhouse gasses only when they are operating.

2025 Integrated Resource Plan

Project Information Session

July 2025

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Land acknowledgment

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.

AGENDA

Topics:

1. Setting the stage
2. Updates since Round 1 engagement
3. Two key findings from modelling and analysis
4. Summary and discussion
5. Next steps

Purpose of today's session

Providing an interim update

- Share what has been heard and how its informing the process.
- Share two key findings from our modelling and analysis.
- Explain how these findings will contribute to the formulation of potential development plans.
- Share the next steps.

Setting the Stage

Where we are in the development process

What is the 2025 Integrated Resource Plan (IRP)?

- A **repeatable process** to **plan for long-term energy needs** that will be updated as future conditions evolve.
- **One output** of the ongoing energy **planning cycle**.
- **Considers policy** from all levels of government; **does not set policy**.
- Includes **all energy supply and grid delivery infrastructure, non-MH owned assets, and customer solutions** that may defer new infrastructure needs.
- **Considers** the impacts to **distribution, transmission and gas delivery systems** beyond those needed for additional generation needs.
- Includes **engagement** to incorporate feedback from customers and interested parties.
- Includes analysis that extends to 2050.
- Will result in a **road map that will include a balanced 10-year recommended development plan**.

Working toward a draft recommended development plan

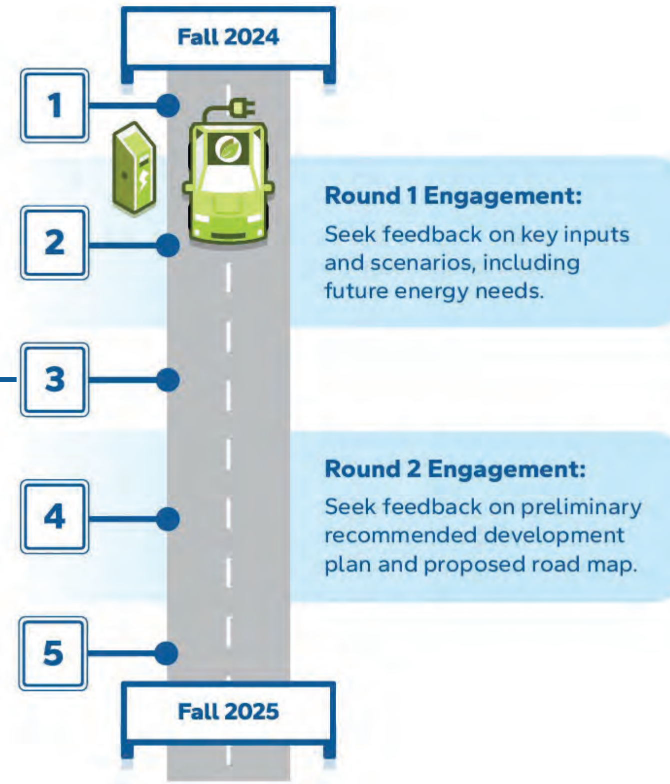
A 10-year development plan is a sequence of actions and investments that:

- Meets Manitoba’s future energy needs;
- Balances factors important to Manitobans – reliability, cost, environmental and socio-economic impacts;
- Provides flexibility for meeting load growth and considers risks to new and existing supply;
- Aligns with Manitoba’s Affordable Energy Plan.

The 2025 IRP Process: how we get there

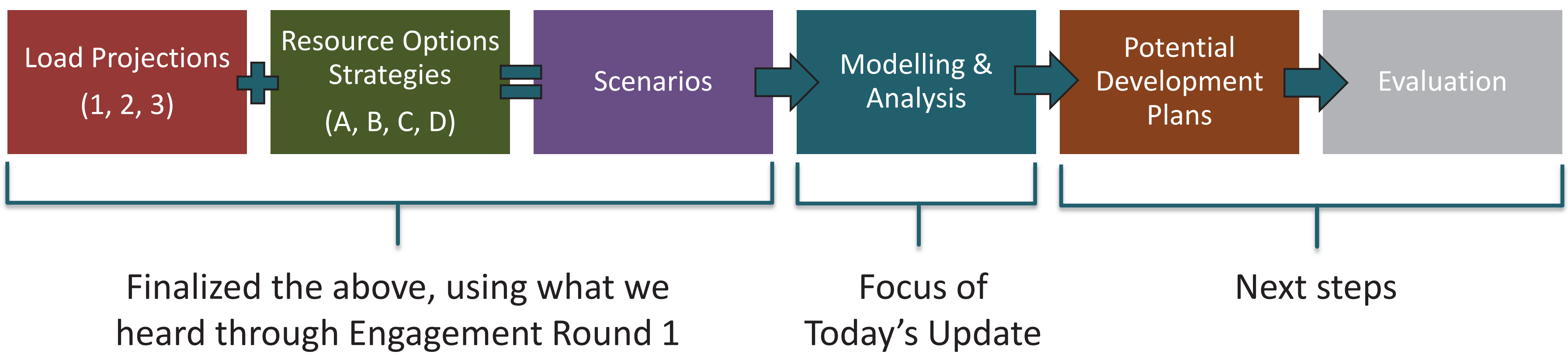
1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan

– we are here



Modelling, analysis, and evaluations

Focusing in on this step in the development process



Updates since Round 1 engagement

The steps we've taken since our last conversation

Concluded Round 1 engagement

Customer Survey	Project Newsletter	Customer Insights	Interested Parties	Technical Advisory Committee
6800	**8700**	**58**	**4**	**4**
Responses	Subscribers	Surveys & Interviews Various Customer Sectors	Virtual Workshops	Meetings

We asked:

- For feedback on key inputs and scenarios to be explored in the 2025 IRP.
- Which factors might be important to consider when evaluating our energy planning.
- About the future energy needs of customers, along with the choices they might make, to better understand how energy demand might grow over time.

A full summary of our Round 1 what we heard is available at hydro.mb.ca/future

Finalized key inputs and scenarios

What we did with this feedback:

- **Added analysis to understand how electricity demands might change** if ground transportation and space heating produce no greenhouse gas emissions by 2050 (i.e., they achieve absolute zero).
- **Revised the resource options strategies** to allow the use of hydrogen, biomethane, and biomass fuels for electricity generation (only restrict the use of fossil fuels in nonextreme circumstances) and **added a sensitivity** to study the impacts of further fuel restrictions.
- Made sure that feedback on assumptions related to **economic development impacts** and **concerns related to Direct Air Capture** are **being considered** through the planned modelling and analysis.
- Participant suggestions for analysis were **already captured through planned modelling and analysis,** including planned sensitivities, others will be considered for ongoing energy planning.
- Confirmed that the **three load projections** represent a **broad but reasonable range** of future energy needs.
- Confirmed that our **eight scenarios** are a **reasonable representation** of the most likely futures.

Clarified evaluation metrics

Reliability	Costs	Environmental	Socio-Economic
Adequate Supply	Net System Costs	GHG Emissions	Economic Reconciliation
Resource Diversity	Customer Direct Costs	Environmental Considerations	Economic Opportunities
Technology Maturity			

Key outcomes from Round 1 engagement included:

- We heard acknowledgement of the past is important and are committed to acknowledging past and current impacts, collaborating to strengthen relationships, and support reconciliation efforts in every aspect of our business, including future energy planning; We also heard Economic Reconciliation is appropriate.
- Led to a **change in our evaluation themes** from "social" to "socio-economic" to more accurately represent metrics.
- While we heard that reliability was the most important factor Manitobans, we still chose to weigh the evaluation metrics equally in assessing the trade-offs between potential development plans.
- Additional feedback was used to make metric descriptions clearer, and to consider for future planning.

Other feedback we heard in Round 1 Engagement

To be considered in ongoing energy planning and shared with relevant teams at Manitoba Hydro

- It was noted that **geographic location / regional differences** should be considered, as perspectives differ across Manitoba.
- Many communities shared that **system reliability** and **enhancements to minimize outages** are important, especially in rural and northern Manitoba.
- Communities **expressed a need for more energy related information and resources,** with many expressing a desire to continue to engage and work in partnership with Manitoba Hydro to plan for future needs.

Two key findings from modelling and analysis

Modelling and Analysis Update

Two key findings have emerged that will help to guide the formulation and evaluation of potential development plans:

- **Six resources are available to meet demand in the 10-year timeframe,** with more options available after 2035. These six resources will form the building blocks of our potential development plans.
- We're narrowing our focus and developing a **load target** for our development plan **(our "build-out target").** While not yet exact, the build-out target will help ensure we're not planning to build too much or too little.
    - It will include a **risk margin** to ensure we consider evolving policy, market conditions and other circumstances.

SIX FEASIBLE RESOURCE OPTIONS

Resource options inventory

- All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in-service.**
- **Intermittent/variable energy resources paired with dispatchable resources** can reliably supply customer demand.

"Natural gas" refers to natural gas, synthetic natural gas, and/or biomethane.

Resource options inventory:

Findings indicate that **six resource options** can be added in the next 10 years.

1. Efficiency Manitoba's base plan;
2. Additional energy efficiency programs, demand response, and the curtailable rate program;
3. Wind;
4. Batteries (short-term);
5. Enhancements to existing hydropower;
6. Combustion turbines that can be fuelled by natural gas, synthetic natural gas, and/or biomethane.

These six feasible resource options will be used to formulate potential development plans.

Resource options inventory:

Other resources are available, but **only after the 10-year** development plan timeframe.

Dispatchable & Mature | Intermittent & Mature | Dispatchable & Emerging

Resources **not available** to potential development plans for the 2025 IRP include:

- New hydropower;
- Nuclear small modular reactors (SMRs);
- Long term battery storage;
- Combustion turbines fuelled by alternative fuels.

RESOURCES NOT AVAILABLE FOR DEVELOPMENT PLANS TO 2035

A closer look at the resources that **are not included** in the development plan timeframe

New hydropower

Why it's not included: long lead times; high costs

Advantages:

- Very long useful service lives (over 70 years).
- Source of dispatchable capacity; reservoirs provide energy storage.
- Lower operating and maintenance costs.
- Negligible operating greenhouse gas emissions.

Why it's not in the 10-year development plan:

- Long lead times for implementation.
- High up-front capital costs.

Utility-scale solar

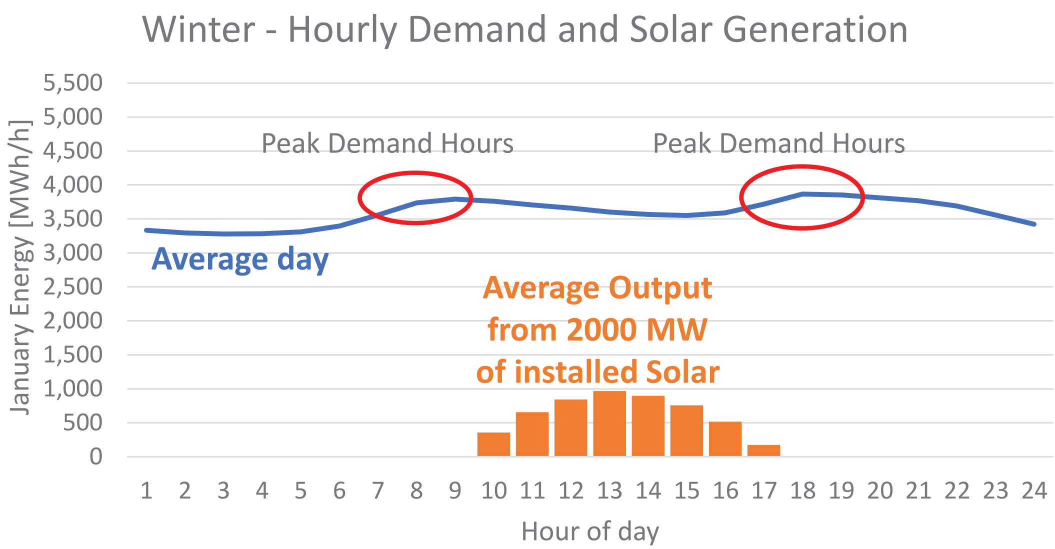
Why it’s not included: high variability; zero accredited capacity in winter; inverse relationship with Manitoba load peaks

Advantages:

- Costs projected to decline and no fuel costs.
- Low maintenance.
- Scalable resource; can be located near transmission or load centres.
- Negligible operating GHG emissions.

Why it’s not in the 10-year development plan:

- Provides zero accredited winter capacity in Manitoba, often covered in snow.
- Energy production profile does not pair well with Manitoba Hydro’s demand.



Nuclear small modular reactors

Why it's not included: high cost; long lead times for regulation

Advantages:

- Reliable baseload power source.
- Negligible operating greenhouse gas emissions.

Why it's not in the 10-year development plan:

- Long lead times due to regulatory requirements (none yet operational in Canada).
- High costs.

Long-term utility-scale battery storage

Why it's not included: emerging technology with limited market availability

Long-term utility scale battery storage refers to storage that requires a duration of 100 hours or more, as compared to short-term storage which generally assumes 10 hours or less.

Advantages:

- High modularity; dispatchable capacity resource.
- Can be sited strategically.
- Can assist in integrating variable resources.
- Negligible operational GHG emissions.

Why it's not in the 10-year development plan:

- High cost, short asset life.
- Emerging technology with limited market availability.

Alternative fuel turbines and technologies

Why they're not included: high cost; fuel supply challenges

Advantages:

- Dispatchable resources.
- Alternative fuels and technologies can lower operating GHG emissions.

Why they're not in the 10-year development plan:

- Limited Manitoba fuel supplies.
- 100% hydrogen turbines are not available in the market for purchase.
- High cost of carbon capture.

Natural Gas Fuelled Combustion Turbine with Carbon Capture

Biodiesel Fuelled Combustion Turbine

Biomass Fuelled Steam Turbine

Biomass Fuelled Steam Turbine with Carbon Capture

H_2

Hydrogen Fuelled Combustion Turbine

RESOURCES AVAILABLE FOR DEVELOPMENT PLANS TO 2035

A closer look at the resources that **are included** in the development plan timeframe

Six resource options are included in the development plan timeframe

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

Efficiency Manitoba's base plan

Why it's included: Defers the need to build infrastructure; can be low cost and quick to put in service

The base plan (Efficiency Plan Projection) includes projected energy savings from Efficiency Manitoba's 2025-28 planning analysis extended out to 2050.

Advantages:

- Supports economic development—can involve local businesses and create jobs for Manitobans.
- Can be low-cost, and typically quicker to put in service than utility-scale infrastructure.
- Many are mature technologies / programs.

Limitations:

- Requires customer commitment for uptake of programs, creates uncertainty in adoption rates and timing.
- Limited market potential.

How we heard Manitobans would like 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.

Additional energy efficiency programs

Why it's included: Defers the need to build infrastructure; can be low cost and quick to put in service; potential for economic benefits

Additional energy efficiency programs can include demand response and curtailable rate programs, along with additional programming for home insulation and home and building heating technologies, ground source heat pumps (various programs), and custom energy solutions for industrial applications.

Advantages:

- Programs can be cost-effective alternatives to adding supply.
- Can have shorter implementation times than other resources.
- High potential for Manitoba economy benefits with potential for economic reconciliation.

Limitations:

- Launching new programs can take time to start up and realize potential.
- Market potential is finite; Program participation is customer-driven and voluntary.

Ground source heat pumps (GSHPs): a closer look

Ground source heat pumps show potential, but significant challenges exist

- Manitoba Hydro engaged a third-party consultant to evaluate ground source heat pumps, both individual installations and large-scale installations (i.e. district systems).
- Preliminary results are showing that ground source heat pumps may be economical when compared to high-cost resources with long development times (e.g. hydropower, small modular reactors).

Continuing study & development

Manitoba Hydro is exploring the potential for smaller pilot opportunities for district ground-source heat pumps, including through existing energy efficiency programs.

Feedback is telling us there is interest in:

- Manitoba Hydro evaluating ground source heat pumps alongside other utility-scale resource options.
- Individual buildings systems and district installations that connect multiple buildings.
- How Manitoba Hydro can support larger district installations.

Wind

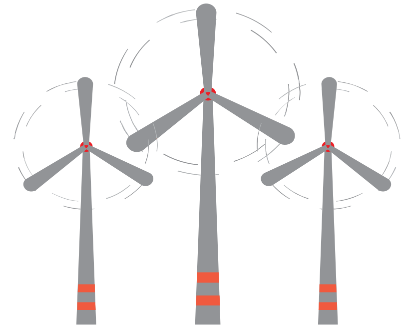
Why it's included: low-cost resource; short construction time; presents economic reconciliation opportunities

Advantages:

- Low-cost electrical energy resource with no fuel costs.
- Relatively short construction time with potential for scaling; can be sited strategically.
- Potential for partnership opportunities and economic reconciliation opportunities for Indigenous Nations.
- Negligible operational GHG emissions.

Limitations:

- Most of the capacity is non-firm—wind is typically accredited at 0-20% of installed capacity.
- Cold weather and wildlife mitigation can limit availability of resource.



Feedback is telling us:

- There is a high level of interest in developing wind energy.

See Manitoba Hydro - Call for power: Indigenous majority-owned wind

Short-term utility-scale battery storage

Why it's included: a modular, dispatchable capacity resource

Short-term utility scale battery storage refers to storage assuming 10 hours or less vs. long-term utility scale battery storage which assumes approximately 100 hours.

Advantages:

- Dispatchable capacity resource.
- Can be sited strategically and is modular.
- Can assist in integrating variable resources.

Limitations:

- High cost, short asset life.
- Can help when energy is plentiful, but not during periods of drought or with cold snaps.

Enhancements to existing hydropower

Why it's included: cost-effective way to add dispatchable power; adds additional firm winter capacity

Advantages:

- Cost-effective.
- Mature technology that provides additional firm winter capacity.
- No facility footprint increases.

Limitations:

- Enhancements take time—most would not be available for the major capacity need date in 2030.
- Primarily adds capacity, with limited energy in some cases.

What we heard:

- It is important to focus on replacing aging infrastructure while also building to accommodate future growth and development.

Natural gas/biomethane fuelled combustion turbines

Why it's included: low-cost, dispatchable capacity; proven fuel supply; mature, scalable technology

Advantages:

- Can be built to meet capacity needs quickly relative to other options.
- Commercially available, scalable to match load growth, and relatively low cost.
- Adds flexible, dispatchable capacity—quick-start operation ideal for serving peaks.
- Proven, reliable fuel supply (in case of natural gas).
- Option to integrate emerging fuel sources as they become viable.
- Low utilization factor (backstop source) mitigates emissions.

Limitations:

- Emits greenhouse gasses when operating.
- High variable operating costs relative to existing generating resources.
- Biomethane and alternative fuels not yet readily available as a fuel supply in Manitoba.

A closer look at fuels

In all potential development plans, CTs start with natural gas—however, they will be alternative fuel-ready

- **Natural gas** is the combustion turbine fuel **consistently selected by modelling** to 2035.
  - This is due to natural gas' **ready and available supply chain,** which **immediately helps** meet capacity needs.
- **Combustion turbines** fuelled by natural gas will be **capable of being fuelled by hydrogen or other alternative fuels** as those fuels become readily available in Manitoba.
  - It is possible to **operate combustion turbines on biodiesel, biomethane,** and **blends of hydrogen with natural gas.**
  - With some additional investment and further study, it is anticipated that **existing combustion turbines** can be converted to **fully operate on hydrogen** once the technology is commercially available.

Acting now to protect our options

Wind: Issuing Call for Power

- Planning to procure up to 600 megawatts of new majority Indigenous-owned wind energy in southern Manitoba through one or more power purchase agreements.
- Expression of Interest closed July 11 and Request for Proposals to come soon. Details are available on MERX.

Natural Gas/Hydrogen/Alternative Fuel Capable Combustion Turbines: Preparatory Steps

- We are taking preparatory steps to reserve a slot in the manufacturing queue and begin preliminary studies in preparation to implement combustion turbines.
- No final decision has been made regarding the fuel source. Initially, these dispatchable capacity resources are expected to be fuelled by natural gas. In the future, it is anticipated that combustion turbines will be capable of operating entirely on hydrogen, biodiesel, and/or other alternative fuels.

Demand Response / Curtailable Rate Program

- Working closely with Efficiency Manitoba to design and implement programming in the coming months and years.

Enhancing Existing Hydropower: Pursuing Refurbishments

- Currently enhancing Pointe du Bois with eight new generating units. Upgrades will increase the station’s capacity by 52 megawatts and will supply an additional 380 gigawatt-hours per year on average.

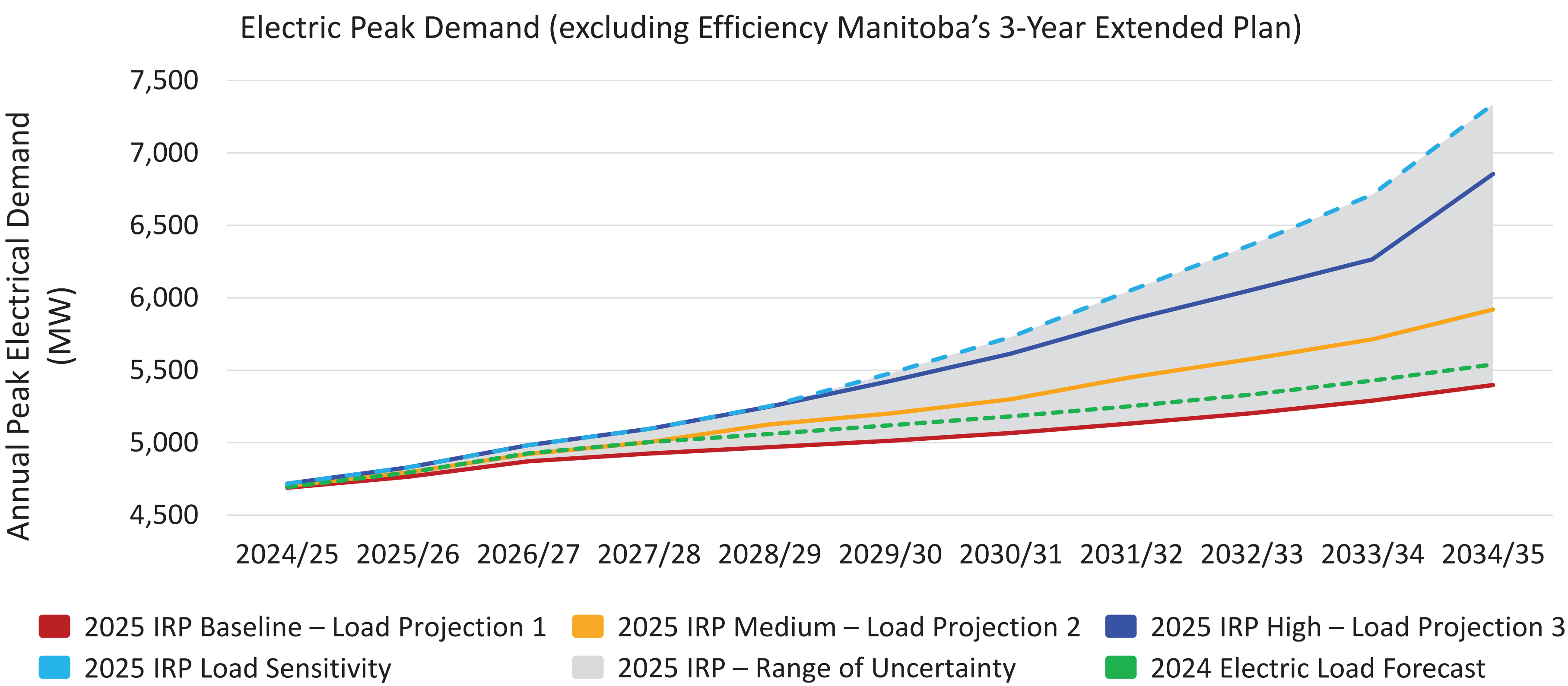
THE BUILD-OUT TARGET: NARROWING OUR FOCUS

What is a build-out target and why do we need one?

- A build-out target establishes a **minimum amount of resources** to allow us flexibility in best serving future needs.
- It helps to **narrow the range of uncertainty** in the analysis of future risks and opportunities.
- It helps to **minimize the risk** of underbuilding or overbuilding for any potential future.
  - The risk of underbuilding is far greater than overbuilding – we can slow down development, but it is very hard to speed up development.

Manitoba's future energy needs

Potential for significant load growth in the next decade, but a lot of uncertainty



Establishing a build-out target

2024 Electric Load Forecast, plus a risk margin

- In the **short term to 2029**, there are currently **insufficient policy instruments** in place that would result in a **load projection above the 2024 Electric Load Forecast**.
- But in the **near-term between 2030 and 2035**, we need **to consider risks and opportunities** beyond the 2024 Electric Load Forecast, such as:
  - **Aging infrastructure** and risks to existing supply;
  - Uncertainty in **load growth**, due to factors like **decarbonization** efforts and **economic development**;
  - **Implementation risks:** we plan to build incrementally and can slow down, but it is not feasible to speed up.
- **Therefore, our build-out target will be the 2024 Electric Load Forecast plus a risk margin.**

Next steps

Formulating potential development plans on the way to a recommendation

What comes next in the 2025 IRP process

1. Formulate and evaluate potential development plans to arrive at a short list.
2. Complete financial & risk analysis on the shortlisted development plans.
3. Develop draft road map, including draft recommended and alternative development plans.

Fall 2025: sharing the draft road map

Feedback on draft road map will be gathered in Round 2

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.

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

July Information Session – Video Transcript

0:03
Hello and welcome to this recording of the project information session for the 2025 Integrated Resource Plan.

0:10
My name is Ryan Siegel and I'm a community consultant with Urban Systems supporting Manitoba Hydro on the engagement for the 2025 Integrated Resource Plan.

0:19
Before we begin, I'd like to invite Lindsay Melvin to provide a land acknowledgement to honor the traditional territories we are joining together on.

0:30
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.

0:50
We also acknowledge the ancestral lands of the Inuit in northern Manitoba.

0:55
We acknowledge these lands and pay our respects to the ancestors of these territories.

1:00
The legacy of the past remains a strong influence of Manitoba Hydro's relationships with Indigenous communities today, and we remain committed to establishing and maintaining strong mutually beneficial relationships with Indigenous communities.

1:19
Thank you, Lindsay.

1:21
I'd like to take a moment to introduce our presenters for this session, Lindsay Melvin, Director of the IRP Division; Lindsay Hunter, Manager of the IRP Policy and Coordination Department; Mike Shaw, Head of Manitoba Hydro's Greenhouse Gas Expertise Section; and Andrea Ruth, Technical Lead for Capacity Expansion Planning.

1:43
We'll start the session with an overview of the 2025 integrated Resource Plan and an update from round one engagement.

1:50
Most of the session we'll look at two key findings for modelling and analysis, and then we'll wrap up with a summary of next steps.

1:59
Today's session is intended to provide an interim update of where we are in the development process, to share two key findings from our modeling and analysis and how these will contribute to the formulation of potential development plans, and to share the next steps in the process.

2:16
To start, Lindsay Hunter will set the stage for the session with an overview of where Manitoba Hydro is in the 2025 IRP development process.

2:28
Thank you, Ryan.

2:29
My name is Lindsay Hunter and I am the Department Manager for Integrated Resource Planning Policy and Coordination here at Manitoba Hydro.

2:38
I'm going to start with a quick overview of the 2025 Integrated Resource Plan and where we are in the development process.

2:45
First, it is helpful to understand what an IRP actually is.

2:49
It is a repeatable utility best practice that plans for how to serve customers long term needs.

2:56
To do this, it incorporates evolving energy policies from all levels of government.

3:01
It considers all energy supply and grid delivery infrastructure including natural gas, electricity generation, transmission, distribution, non Manitoba Hydro assets as well as Efficiency Manitoba programming.

3:17
The 2025 IRP itself includes analysis that extends to 2050 and will result in a road map which will include a recommended development plan of 10 years.

3:29
The goal of the 2025 IRP is to arrive at a balanced recommended development plan that considers the many priorities of the energy future.

3:39
It will be a 10 year plan that: meets Manitoba's future energy needs.

3:44
Balances factors that are important to Manitobans. We've heard over the last few years that these factors include reliability, cost, environmental and socio economic impacts.

3:57
The plan will also provide flexibility for meeting load growth, and it considers risk to new and existing supply, so it can perform well under changing circumstances.

4:08
And finally, there is a plan that will align with our new energy policy, Manitoba's Affordable Energy Plan.

4:16
With that in mind, let's take a closer look at where we are currently in the process.

4:22
The development process for the 2025 IRP consists of five steps.

4:27
We completed Step 2 in Fall of 2024 and are currently working to complete the third step of modeling analysis and evaluations.

4:36
After we are done this, our next steps include working towards a draft recommended development plan to be shared in round two engagement which is planned for Fall of 2025.

4:49
On this slide, we are showing a breakdown of the second and third steps in our development process.

4:54
In round one engagement in the fall of 2024, we reviewed the draft 2025 IRP key inputs and scenarios and introduced the evaluation metrics.

5:05
In our next section of this presentation, I will review how the feedback heard through this engagement was incorporated into the 2025 IRP to finalize the key inputs and scenarios.

5:19
Since this fall, we have been working on the modelling and analysis and today's conversation will provide an interim update to share some key findings.

5:28
One thing we have experienced is the modelling and analysis is taking more time than expected.

5:34
After this fall engagement session.

5:36
We had committed to presenting a draft recommended development plan this spring, but we're not quite there yet.

5:43
Creating a development plan is a very complex process and any plan we recommend needs to reflect many different considerations.

5:51
To do this properly takes time, more time than we had thought when we committed to sharing the development plan this spring.

5:58
For that reason, we are taking some additional time to complete a more fulsome evaluation and review process prior to shortlisting and making a recommendation.

6:10
Now I will spend some time reviewing the feedback that we've heard from a round one engagement and how we've incorporated this into the 2025 IRP.

6:22
An important aspect of an IRP is the engagement feedback received and how that informs the development of the IRP.

6:30
Last fall, we sought feedback through our round one engagement.

6:34
We had great participation and a lot of really good feedback was heard and we asked for this feedback from a number of different audiences.

6:42
Our customer survey had 6800 responses with a variety of customer perspectives from across Manitoba.

6:51
We also share communication through our subscriber list.

6:54
The list grew by about 1500 people, so people are showing an interest of following along and participating in the process.

7:02
We interviewed customers to understand their future energy needs to make sure that the 2025 IRP reflected these in our study.

7:10
There were four virtual workshops, much like we are doing today, where interested parties could share feedback and engage in dialogue.

7:18
And new to the 2025 IRP is the Technical Advisory Committee.

7:23
The Technical Advisory Committee is a group of people and organizations who are active participants in energy planning and have committed to sharing their expertise and feedback in more detail during the development of the 2025 IRP.

7:37
If you would like to know more, there is a section on our website with the committee's presentations and meeting notes.

7:44
If you would like to know what kinds of feedback we heard during round one engagement and how it was used, there's a full summary on our web page.

7:53
One of the areas of focus we sought feedback on during the fall was the drafted key inputs and scenarios.

8:00
A few themes emerged from the feedback.

8:03
The first was to understand how electricity demands might change in a future where the goal was absolute zero emissions.

8:11
While the proposed analysis of the 2025 IRP included net zero by 2050 economy futures, we heard that it should also considered what is required to go beyond net zero and achieve absolute zero emissions from the transportation and space heating sectors.

8:29
This analysis was added to the 2025 IRP.

8:33
The second key theme of feedback was centered around assumptions proposed for policies that restricted fuel based electricity generation resources and that these assumptions did not reflect realistic policy and would overly restrict the analysis.

8:49
These assumptions were adjusted based on these feedback.

8:53
We also had a lot of discussion and feedback around assumptions related to economic development impacts and the reliance on negative emissions technology in the analysis, such as direct air capture to meet net zero objectives.

9:08
We reviewed the analysis based on this feedback to ensure that it adequately captured economic development impacts.

9:15
We also planned additional analysis to test and ensure that the assumptions made related to negative emissions technology around 2050 would not have an impact on the decision that needed to be made in this IRP.

9:30
In addition to these key themes heard, the feedback also confirmed the proposed 3 load projections and the 8 scenarios.

9:40
The second area of focus we sought feedback on during the fall was on the evaluation metrics.

9:46
The summary of engagement feedback on our website includes a more fulsome account of engagement on the evaluation metrics.

9:53
Overall, we heard that the appropriate evaluation themes and metrics were included.

9:58
Some key pieces of feedback that we did hear, which are being incorporated into our work include the importance of considering reconciliation efforts in the IRP development, including acknowledgement of past and current impacts in the evaluation metrics.

10:13
We also heard that a focus on economic reconciliation is appropriate when considering and evaluating potential development plan opportunities and perhaps should be its own theme.

10:25
We heard consistently through all of our audiences that reliability was the most important factor for energy planning.

10:31
We still chose to weight the metrics equally when using the themes and metrics to evaluate the trade-offs between potential development plans.

10:40
We also heard a lot of feedback to make the descriptions of the evaluation metrics clearer.

10:46
We also heard some feedback that was not specific to the IRP or cannot be included in the 2025 IRP.

10:54
Where we can consider this feedback in other ongoing energy planning or future IRPS, it has been shared with other relevant teams at Manitoba Hydro.

11:04
One example is that geographic or regional differences should be considered. Because the IRP considers all of Manitoba's needs,

11:12
this type of analysis is best done outside of an IRP.

11:16
We also heard from many communities that system reliability and enhancement to minimize outages are important.

11:23
Another example heard was the expressed need from communities for more energy related information and resources.

11:31
Now that we have reviewed the feedback heard in round one engagement and how it helped to finalize our key inputs and scenarios, I will pass the presentation along to Mike Shaw who will start us off by explaining our two key findings from the modelling and analysis.

11:47
Thank you, Lindsay.

11:48
Hi, everyone.

11:49
I'm Michael Shaw, the head of our Greenhouse Gas Expertise section here at Manitoba Hydro.

11:55

Along with my colleagues Andrea and Lindsay, we will share on two key findings that will guide the formulation and evaluation of potential development plans.

12:05

First, we'll share more detail about the six feasible resource options that show the most promise for meeting demand in the next 10 years, which is our development plan time frame.

12:15

We'll look at the advantages and key limitations of each of these options and we'll clarify why they're available for inclusion in potential development plans.

12:24

We'll also look at the advantages and limitations of the other options that aren't considered available in the 10-year timeframe but may be available after 2035.

12:34

Secondly, we'll discuss how we are working to narrow our focus as we look closely at the next 10 years.

12:41

Taken together, the range of load projection studied in this IRP result in a really broad range over the next 10 years, nearly a 2000 MW difference between the highest and lowest projections by 2035.

12:54

As a point of reference, Manitoba's peak load is currently 4700 megawatts, So for Manitoba, 2000 megawatts is quite a bit.

13:03

So to create a development plan, we need to understand what level of build allows us the flexibility to best serve a reasonable range of loads.

13:11

To do this, we are narrowing the range of load projection uncertainty we're planning for by setting a minimum build out target.

13:19

This will help us ensure we're not planning to build too much or too little.

13:24

We will also include a risk margin to ensure there's flexibility to consider evolving policy, marketing conditions and other circumstances.

13:35

First, let's take a quick step back before beginning our discussion of the six feasible resource options.

13:43
We'll start with a review of all the resource options we currently have in our model, which are shown in this figure.

13:49
And even though it is not currently an option in our model, we've also included long term batteries on the list as it's a conceptual resource that we'll discuss later on.

13:59
Each resource option has its own unique set of characteristics in the model and this includes cost, greenhouse gas, emission rates, dispatch ability, maturity, and the earliest time to in service.

14:12
Since the development time frame is 10 years, the earliest time to in service is a key characteristic.

14:18
Some options have an in service date after the 10 year time frame and therefore cannot be included in potential development plans.

14:26
In the figure, the resource options have been categorized based on some of these characteristics.

14:31
Resource options shown in blue are dispatchable and mature.

14:36
Options shown in green or intermittent and mature, and those shown in orange are dispatchable and emerging, typically with assumed earliest in service dates beyond the next 10 years.

14:48
While this slide highlights individual resources and how their characteristics vary, it's also important to consider how different sets of characteristics can complement each other and help resources work together in the system.

15:01
For example, pairing a variable energy resource like wind with a dispatchable capacity resource option such as a combustion turbine can ensure that we are reliably supplying customer demand.

15:16
Over the course of the 2025 IRP’s modelling and analysis work, we have confirmed 6 feasible resource options that can be used in a 10-year development plan.

15:25
These resource options include efficiency Manitoba's based plan, additional energy efficiency programs along with demand response and curtailable rate programs, wind, utility scale battery

storage, enhancements to our existing hydropower system, and combustion turbines supplied by our Centra Gas system.

15:47
These are the six feasible resource options that will be used to formulate the potential development plans.

15:53
And as you can see, all six of these resource options are mature technologies.

16:00
Once we move beyond the 10 year development plan time frame, there are other options that could potentially become feasible for meeting growing demand.

16:09
These resources are highlighted on this slide.

16:12
In the near term, these resources are not considered feasible since they are either still emerging, have unreliable or uncertain fuel supplies, have earliest in service states that are too late to help meet our near term needs, or they just aren't a good match for a system.

16:30
We'll start by getting into more detail on the resources that are not considered feasible to 2035.

16:38
Let's start with new hydropower options.

16:41
Hydropower resources offer several advantages, including a very long useful service life which can be over 70 years.

16:48
They're also a source of dispatchable capacity for a system, and their associated reservoirs can provide some energy storage that lets us shift generation to times when we need it most, hour to hour, day-to-day, and sometimes season to season.

17:04
However, new hydropower is not considered a feasible resource option for the 10 year development plan due to its long lead times.

17:12
These options won't be ready when we need them.

17:15
Most of our new hydropower options cannot be in service until the late 2030's to 2040's.

17:21
Hydropower also has high upfront capital costs and is not economically competitive with other options.

17:31
Next up is solar, a resource that is being built more and more throughout North America.

17:36
Solar costs, which have already dropped considerably over the last couple decades, are projected to decline out into the future as well, and there are no associated fuel costs.

17:47
Additionally, utility scale solar is generally low maintenance and new solar installations can be strategically located near transmission or load centres.

17:57
Solar is also scalable, meaning that amounts added to the system can be well matched to low growth.

18:03
You don't have to build solar in large chunks, but solar is not included in the 10 year development plan because it provides 0 accredited winter capacity in Manitoba, which is what our system needs.

18:15
Solar's energy production profile is poorly matched with Manitoba demand, as shown in this figure.

18:21
The blue line indicates Manitoba Hydro's hourly demand profile for the winter, while the orange bars show the generation profile of solar.

18:30
As you can see, demand peaks in the morning around 8:00 AM and in the evening towards 6:00 PM when it's dark and there's no solar generation occurring.

18:40
Solar also produces much more energy in the summer than the winter.

18:44
Conversely, Manitobans use more energy in the winter than in the summer.

18:49
In many other regions in North America, the opposite is true and solar is a better fit.

18:56
Now we'll look at nuclear small modular reactors or SMRs.

18:58
SMRs could potentially provide reliable base loaded power for our system.

19:06
However, SMRs are not considered feasible for a 10-year development plan because they cannot feasibly be in service in Manitoba within the next 10 years.

19:16
There are currently no operational examples in Canada and uncertainty around regulatory requirements and technology maturity also translates into assumed long lead times for SMRs. SMRs also have a high upfront capital cost and are not economically competitive with other options.

19:36
Utility-scale long duration battery storage is also not a feasible option for our 10-year development plans.

19:43
The long duration storage option referred to here assumes seasonal storage, which reflects the needs of our system.

19:51
This requires a duration of 100 hours or more as compared to short term storage which generally assumes 10 hours or less.

19:59
Not only is this resource option not considered feasible in the near term.

20:03
It was also not directly included in our modelling as there's still a lot of uncertainty around this technology and other long duration energy storage options.

20:11
Right now, this is more of a concept than a resource option.

20:16
The potential advantages of long duration battery storage include that it's a dispatchable source of capacity with high modularity.

20:23
This means it could be built in smaller sizes, which allows it to be cited strategically within our system.

20:30
It's dispatchability also makes it useful for helping to integrate variable resources like wind into the system.

20:37
However, as mentioned, long duration battery storage currently isn't considered a feasible resource for the potential development plans. With present day technology it's a very high-cost capacity option, with costs increasing with duration.

20:52
And more importantly, other emerging storage technologies could be more appropriate for seasonal energy storage for our system, for example, thermal and compressed air energy storage systems.

21:03
Lastly, batteries also have shorter asset lives than other available resource options.

21:10
Finally, we have alternatively fueled turbines and technologies.

21:15
This category includes a number of different combustion turbine types, including biomass fueled steam turbines, biomass fueled steam turbines with carbon capture, natural gas fueled combustion turbines with carbon capture, biodiesel fueled combustion turbines, and hydrogen fueled combustion turbines.

21:33
Because all of these options are turbines and operate on fuel, they all have the advantage of providing dispatchable capacity and some of these options can provide dispatchable capacity without operating very much or by burning very much fuel.

21:47
However, these turbine options are not feasible for our 10-year development plans, for most of these options that's primarily because of the limitations and uncertainty around their fuel supplies.

21:59
While alternative fuels are starting to become available, it is not expected that within the next 10 years they will be dependably available in sufficient volumes in Manitoba to meet the reliability needs of our electricity system.

22:14
While we could potentially start to use these fuels over the next 10 years.

22:18
Their use would need to be backed up by a reliable fuel like natural gas.

22:23
It's possible we can use them, but we can't yet assume we can rely on them 100% of the time.

22:30

Additionally, these resource options either have technology or fuel supply components that are considered emerging.

22:37
For example, 100% hydrogen fuel turbines are not currently commercially available in the market for purchase.

22:44
However in the future this technology is anticipated to be available.

22:50
Combustion turbine vendors have communicated that first of their kind fully hydrogen ready turbines capable of operating on a 100% hydrogen are likely to appear in the early 2030's. Once both standard combustion turbine technology becomes fully hydrogen-ready, and a reliable hydrogen fuel supply is established.

23:12
It is likely that with additional investment, partially hydrogen ready turbines can be converted to fully hydrogen ready combustion turbines. For evaluation purposes, we currently estimate that this could happen as early as 2035.

23:28
As another example, while both biomass turbines and industrial carbon capture exist, the combination of these technologies is still in the demonstration stage of technological development.

23:41
I will now pass it over to Andrea to talk about the resources that are available to 2035.

23:49
Hello.

23:49
My name is Andrea Ruth and I am the Capacity Expansion Planning Technical Lead in the Energy Resource Planning department at Manitoba Hydro.

23:58
So now we're going to move on from discussing what we haven't included to get into a little bit more detail on the resource options that are the most promising for our 10-year development plans out to 2035.

24:12
As already introduced, the six feasible resource options that we've confirmed for our 10 year development plans are efficiency Manitoba's base plan, additional energy efficiency programs, demand response and curtailable rates programs, wind enhancements to existing hydropower facilities, short duration batteries and combustion turbines supplied by our central gas system.

24:39
These resource options have a few things in common.

24:42
They can be implemented within the 10 year development plan time frame.

24:46
They are able to reliably meet our energy and capacity needs, and they are proven technologies that have reliable fuel sources available in the near term.

24:57
You'll note that most of these options are also dispatchable, with wind being the only option characterized as intermittent.

25:04
This is not surprising as the key need for our system as load grows will be dispatchable capacity.

25:13
So the first feasible resource option we'll look at is the Efficiency Manitoba based plan.

25:19
Projected energy savings are based on Efficiency Manitoba's 2025 to 2028 analysis, extended out to 2050.

25:29
The Efficiency Manitoba Act requires Efficiency Manitoba to achieve both electrical and natural gas energy savings targets. So, some of the advantages of this resource option include that it can support economic development through the involvement of local businesses and the creation of jobs in Manitoba.

25:49
The programs included in the base plan can be comparatively low cost and can also be quicker to put into service than some of the other utility scale infrastructure options.

26:01
And many of the programs and technologies in the plan are also mature and so have the benefit of less uncertainty around cost, performance and availability than emerging technologies.

26:13
On the other hand, there are some limitations associated with the base plan.

26:18
Realizing the capacity and energy savings assumed in the plan means relying on customer commitment and program uptake, and this introduces a new source of uncertainty around the achievability of the assumed adoption rates and program savings.

26:34
This is also a resource with limited market potential.

26:38
Tying to back to what we heard during engagement, we know that Manitobans want to be involved in how we meet future demand.

26:46
Specifically, we heard that residential customers are interested in tracking and managing their own energy use and that there is increasing interest in energy storage and heat pumps, and that community energy goals are including a focus on self generation opportunities such as energy storage and energy efficiency upgrades.

27:08
This next category of feasible resources includes additional energy efficiency above and beyond what is included in Efficiency Manitoba's base plan, as well as demand response and curtailable rates programs.

27:22
Efficiency Manitoba's plan mostly focuses on energy savings, with capacity savings typically being a side benefit.

27:30
So there are opportunities via demand response to achieve additional capacity savings, which helps address a key need for our system.

27:40
Beyond capacity focused programs, some of the additional energy efficiency programming that's considered includes home insulation, home and building heating technologies, heat pumps and custom energy solutions for industrial applications.

27:55
These programs can be cost effective ways to add supply compared to other resource options and they can also have shorter implementation time frames.

28:05
These options may be helpful in meeting our near term demands that can occur before other resource options are available.

28:13
There is also a high potential for broader benefits to Manitoba's economy, including potential for economic reconciliation.

28:21
On the limitation side, some potential additional energy efficiency programs are untested and we are

relying on market potential studies to inform our assumptions, including defining limitations on their market potential.

28:35
Just like Efficiency Manitoba's base plan, these programs depend on voluntary customer participation, which also creates uncertainty around the achievability of the program savings.

28:48
Finally, there is an added uncertainty related to launching new programming along with the potential for delays in realizing any anticipated program savings.

29:01
Now we'll take a closer look at ground source heat pumps, which show potential but still have significant challenges to overcome before large scale installations are considered feasible.

29:12
To date, Manitoba Hydro has been working with Efficiency Manitoba and a third party consultant to get a better understanding of both large scale and individual ground source heat pump installations.

29:26
Preliminary findings are telling us that large scale district installations are not feasible or economic in the near term.

29:34
However, they may be competitive in the long term when compared to higher cost resources with longer lead times.

29:42
Manitoba Hydro is continuing to study district ground source heat pump systems and is looking into potential small scale pilot projects, including through existing energy efficiency programs.

29:54
This work is in line with the feedback that we have gathered, which tells us that there is interest in both individual and district installation options.

30:04
We are exploring how we can support district installations while also evaluating ground source heat pumps alongside other resource options in our planning.

30:15
The next feasible resource option that we'll talk about is wind.

30:19
Wind has several advantages.

30:21
It's a lower cost energy resource and it has no fuel costs.

30:26
Wind also has a relatively short construction timeline with good potential for scaling, and it can be cited strategically within the system.

30:35
And there are partnership opportunities that could support economic reconciliation with Indigenous nations.

30:41
You can find more information on this by clicking on the provided link which gives details on the call for power issued by Manitoba Hydro for up to 600 megawatts of majority owned Indigenous wind as announced in Manitoba's Affordable Energy Plan.

30:57
An important limitation of wind is that most of the capacity installed will not result in accredited capacity, something that we expect to be short of in the next 5 to 10 years.

31:09
New wind in our system is accredited anywhere from zero to 20%, with the first new additions at 20%, then moving towards 0% as we add more wind.

31:20
It's also important to note that wind availability can be affected by both cold weather and wildlife mitigation requirements.

31:28
While wind can be cited strategically, locations in Manitoba which are less optimal when considering existing transmission infrastructure will be more costly and take longer to build.

31:40
Also, some locations may need to be avoided due to wildlife concerns.

31:45
Connecting back to the feedback we've heard, we know that there is a high level of interest in developing wind energy.

31:54
Next, we have utility scale short term battery storage.

31:58
Advantages associated with short term batteries include that they provide dispatchable capacity, that they're highly modular making them scalable so that the amount added to the system can be

matched to our needs and they can be cited strategically, and they're helpful for integrating variable resources like wind into our system.

32:18
However, batteries are a high cost source of capacity that come with a shorter asset life than other feasible resource options.

32:27
They also have a finite ability to reduce our peak demand, which is based on Manitoba's hourly demand profile and the ability to charge and discharge the battery daily during a multi-day peak event, such as a winter cold snap.

32:41
We assume that the maximum amount of short term batteries that can effectively be connected to our system is around 350 megawatts.

32:50
Beyond that, longer term storage options, which are typically more costly, would be required.

32:56
Batteries also reduce the system's accredited energy due to inefficiencies during charging and discharging.

33:03
Batteries use up energy on an annual basis.

33:06
This is similar to how hydrogen combustion turbines would function.

33:10
Both technologies are net consumers of electricity.

33:14
While batteries are helpful for meeting peak demand when the energy is available to be shifted, they are often much less helpful during times of energy scarcity, like during a drought or an extended winter cold snap.

33:28
Now we'll focus on enhancements to existing hydropower facilities.

33:32
Advantages of these types of projects include that some of these projects can be cost effective.

33:38
It can make financial sense to enhance what we already have.

33:42
That hydropower itself is a very mature technology that we're comfortable and familiar with at Manitoba Hydro.

33:48
That enhancement projects add valuable accredited winter capacity to our existing system.

33:55
And because enhancement projects reuse existing sites, there is no new footprint which keeps incremental environmental impacts quite small.

34:05
Limitations associated with enhancement projects include that they take time to implement and in some cases they would not be in service to meet capacity needs in 2030.

34:15
In undertaking these projects, we also often have to take existing units offline and need to plan for that reduction in our overall system capacity.

34:25
There can also be no gain in dependable energy from these projects.

34:29
Similar to batteries, they're often capacity only.

34:33
Another key limitation of this resource is that we have a limited number of potential enhancement projects available.

34:39
There's a limited amount of megawatts that can be effectively added to our system through enhancements.

34:45
Linking back to what we've heard, feedback has indicated that it's important for us to focus on replacing our aging infrastructure while we build to accommodate future growth and development.

34:57
Finally, we have natural gas fuel combustion turbines, which are also capable of operating on biomethane, biodiesel and even some hydrogen.

35:08
One of the most important advantages of natural gas combustion turbines is that they can be in service and relied upon to meet capacity needs by 2030.

35:18
These combustion turbines are already commercially available, they are scalable to match load growth and they are a relatively low cost source of dispatchable capacity.

35:29
They provide flexibility for the system to respond to peaks in demand.

35:34
From the fuel perspective, there is an established and reliable supply of natural gas.

35:40
We haven't made any decisions around fuel supply yet, but we assume that the turbines will be able to transition to alternative fuel supplies as they become readily available in the future.

35:52
From our analysis, we know that combustion turbines added to our system are expected to be used minimally on average, functioning primarily as a backstop resource in the system, such as during times of drought, extreme weather, or during other system contingencies.

36:10
So while running CTs with natural gas will produce some GHG emissions, this is mitigated by how little the units are expected to run on average.

36:21
Manitoba Hydro will be able to leverage the dispatchable capacity benefits of combustion turbines in the system while still complying with federal clean electricity regulations and achieving provincial net zero grid targets.

36:36
But as noted, GHG emissions are still produced when the combustion turbines are running using natural gas, and this can be considered a limitation for this resource option.

36:47
This could be fully mitigated by using biomethane instead, but a reliable supply of this fuel is not yet available in Manitoba.

36:56
Operating costs for these combustion turbines can also be high compared to other generating resources in the Manitoba hydro system, but the expected low usage of these units on average will help to minimize this cost.

37:12
Take a moment to focus on fuel supply options a little bit more.

37:16
Our modelling results consistently include the addition of combustion turbines fueled by natural gas.

37:23
This is a direct result of the mature nature of combustion turbines and natural gas fuel supplies, which means they are available, reliable and cost effective when we need them in 2030, while other resource options remain limited.

37:39
Modeling results have also shown that natural gas fueled combustion turbines remain an economic choice for adding and maintaining dispatchable capacity beyond 2035, including in a net zero grid future.

37:54
Once alternative fuels become more readily available, such as hydrogen, we assume that combustion turbines in our system will be able to run on them with some additional operating costs or additional investments.

38:07
This includes investment both at generating stations and along fuel supply chains.

38:12
However, it is uncertain when natural gas would no longer be needed in at the very least a backup roll.

38:20
Further studies are required to investigate the use of alternative fuels.

38:27
Manitoba Hydro is already taking steps to protect the feasibility of the resource options we just reviewed.

38:33
We have issued a call for power for up to 600 megawatts of majority Indigenous owned wind in southern Manitoba.

38:41
This could take the form of one or more power purchase agreements.

38:45
The expression of interest closed on July 11th and a request for proposals will be issued soon.

38:50
Once issued, you'll be able to find more information on this by clicking on the provided link for MERX.

38:56
We're also taking preparatory steps for combustion turbines.

39:00
These actions will allow us to secure a spot in the turbine manufacturing queue and let us start working on preliminary studies that'll get us ready to potentially implement combustion turbines by 2030.

39:13
We are also actively exploring both offsets and alternative fuels as potential options to net out emissions for future and existing combustion turbines.

39:24
And we are also continuing to work closely with Efficiency Manitoba to design and implement programming for the coming months and years.

39:32
Finally, we are actively pursuing refurbishments at Point du Bois, our oldest operational hydropower station.

39:39
This enhancement project includes 8 new generating units and will increase the station's capacity by 52 megawatts and average annual energy supply by 380 GW hours.

39:52
I'll now pass it over to Lindsay Hunter to talk a little more about our second key finding related to narrowing our focus.

40:01
The second key finding in our work is the need to establish a build out target.

40:08
Having a build out target establishes the minimum amount of resources needed to provide us the flexibility to best serve future needs.

40:16
The build out target will help narrow the range of uncertainty in the analysis.

40:20
While we are narrowing the range of uncertainty, it helps provide focus to the key risks and opportunities that need to be considered in the development plan.

40:29
By narrowing the range of uncertainty, we also minimize the risk of both underbuilding and overbuilding for any potential future.

40:36
Looking at this risk, we know that the risk of underbuilding is far greater than overbuilding.

40:42
It is much easier for us to slow down any development, but is very hard to speed up development.

40:49
The range of uncertainty that has been explored to date in the 2025 IRP is shown on this chart that shows the load projections we have been studying through the 2025 IRP.

41:01
This broad range includes the base load projection one shown as the red line, the medium load projection shown as the yellow line, and the high load projection shown as the dark blue line.

41:14
We also added the load sensitivity, which is shown as the dashed light blue line.

41:20
Looking at Manitoba's future energy needs, this is a really broad range in only 10 years. By 2035, there is approximately 2000 megawatts difference between the red load projection one line and the blue dashed load sensitivity line.

41:38
As an illustrative example, 2000 megawatts is equivalent to the size of about 3 Keeyasks.

41:46
Establishing a build out target will help to narrow this range of uncertainty as we move towards recommending a development plan.

41:54
We can take first steps now though.

41:56
On this chart we've also plotted the 2024 electric load forecast, which is the dashed green line above load projection one.

42:05
As the 2024 electric load forecast is used in the most recent annual planning at Manitoba Hydro and is the most recently approved load forecast, we are setting this as our minimum build out target.

42:19
What we are still working on is what will be the build out target above the 2024 electric load forecast.

42:28
We first consider the short term to 2029, there are insufficient policy instruments in place that would result in a load projection above the 2024 electric load forecast.

42:39
The build out target in this time frame will be equivalent to the 2024 electric load forecast.

42:45
If we look further into the near term between 2030 and 2035, the build out target will help us to balance risks and opportunities such as aging infrastructure, including risks to supply load uncertainty, which could result in higher or lower load growth from things like decarbonization and economic development opportunities and implementation risks.

43:09
Unlike in the past where we built large scale resources ahead of load growth, we will be building much more incrementally to match the load growth.

43:18
This means that it is easier for us to slow down than it is to speed up.

43:23
When taken together, we know that the build out target will be the 2024 electric load forecast plus a risk margin.

43:31
I will now pass the presentation along to Lindsay Melvin who will walk us through our next steps.

43:38
I'd now like to spend a few moments on next steps.

43:45
Our teams are working hard to move forward with the knowledge gained from our work to date to formulate and evaluate and assess potential development plans.

43:55
Now this step will enable us to determine a short list of plans that can then move forward in our next step, which will be the completion of financial and risk analysis.

44:05
And once we have the financial and risk analysis completed on this short list of development plans, we will then be in a position to develop a draft recommendation on a development plan.

44:16
And we will also develop our draft road map including the draft recommended and alternative development plans.

44:22
And all of this will be presented in round two engagement.

44:28
To give you a bit of a glimpse of what you can expect in round two engagement.

44:32
The following is a quick overview of each of the components you will see in the 2025 IRPs Draft Road map.

44:40
The road map consists of four components, recommended and alternative development plans, learnings, near term actions and signposts.

44:51
The recommended development plan will be a 10 year development plan indicating the specific and future investments needed to meet future energy needs.

45:00
The plan indicates the type, amount and sequencing of resources.

45:06
It does not indicate the specific location or project delivery method for a resource.

45:11
This will be determined through other processes.

45:14
It is also common practice to put forward one or two alternative development plans to show the other development options that were considered but not recommended.

45:23
This helps us understand what our next best solution could be and also what trade-offs exist between the development plans.

45:31
These are the plans that would most likely be limited, either fully or partially if something happens such that the recommended plan was no longer a viable option.

45:41
The next component in our road map is key learnings.

45:44
These represent the fundamental takeaways from the entire 2025 IRP development process, including our analysis out to 2050.

45:53
Learnings could come from engagement and research or modeling and analysis and evaluations.

45:59
The near-term actions outline the actions that Manitoba Hydro will take over the next five years.

46:04
These actions include implementing the recommended development plan and also continuing to prepare for the future.

46:12
The signposts are key indicators that we will monitor to tell us something about the timing, pace and magnitude or type of changes happening in the evolving energy landscape.

46:23
Signposts could include policy or market and technology and customer trends, and they're typically monitored especially between IRPs.

46:32
The signposts in their monitoring are used to determine if a near term action needs to be accelerated or even cancelled based on changes in the energy landscape.

46:43
So overall, this draft road map will be presented as draft for discussion and feedback when we come back together for round two engagement.

46:53
This concludes the information session presentation.

46:56
Thank you for taking the time to listen to this recording.

46:59
For more information about the 2025 Integrated Resource Plan, you can visit the link on the screen at hydro.mb.ca/future.

47:07
If you have any further questions or want to reach the team, you can e-mail us at IRP@hydro.mb.ca.

47:15
Thank you again and have a great day.

Manitoba Hydro
energy for life

2.9. IP Mid-Project Information Session Participation Summary

Participants	Date	Attendance
Interested Parties and Government of Manitoba Departments	July 16, 2025	60
Interested Parties and Government of Manitoba Departments	July 22, 2025	33
Interested Parties and Government of Manitoba Departments	July 23, 2025	29
TOTAL		**122**

Indigenous Nations, municipalities, and interested parties represented at Interested Parties Sessions:

AECOM
Amstead Rail
Boke Consulting
Business Council of Manitoba
Canadian Manufacturers and Exporters
Chemtrade
City of Brandon - Sustainability
City of Dauphin
City of Portage La Prairie
City of Winkler
City of Winnipeg
Climate West
Communities Economic Development Fund
Department of National Defence
Diageo
Efficiency Manitoba
Electranix Corporation
Electric Power Research Institute
Enbridge
Fort Richmond University Heights Neighbourhood Association
Gerdau
Green Action Centre
Hatch
HyLife
Ibasa Enterprises Inc.
International Institute of Sustainable Development
Keystone Agricultural Producers
KGS Group
Koch Industries

Manitoba Building trades
Manitoba Eco-Network
Manitoba Energy Justice Coalition
Manitoba Environmental Industries Association
Manitoba Home Builders Association
Manitoba Motor Dealers Association
Manitoba Trucking Association
Maple Leaf Foods
New Flyer Industries
Northern Association of Community Councils
Red River College Polytechnic
Retired Manitoba Hydro Employee
RM of Norfolk-Treherne
Rural Manitoba Economic Development Corporation
Rural Municipality of Piney
Rural Municipality of Victoria
SANDGEO Inc.
Soft White 60
Southern Chiefs Organization
Stantec Consulting Ltd.
Steinbach Chamber of Commerce
Switch Energy
Town of Carberry
Town of Neepawa
Tundra Oil and Gas
University of Manitoba
Winnipeg Economic Development and Tourism
University of Winnipeg
Vale
Winnipeg Chamber of Commerce
Winnipeg Metro Region
Winnipeg Regional Health Authority
WSP Canada Inc.

2.10. IP Mid-Project Information Session Questions and Answers Summary

MANITOBA HYDRO'S
2025 INTEGRATED RESOURCE PLAN

Mid-Project Information Sessions **Questions and Answers**

The following are responses to questions received through the mid-project information sessions held in July 2025 as part of our 2025 Integrated Resource Planning Process.

Climate Risk

How are projected climate change impacts considered in the IRP?

Climate change has the potential to impact Manitoba Hydro through its effect on the water supply used for generating hydropower and through its effect on demand for capacity and energy.

The 2023 Integrated Resource Plan included a sensitivity analysis that explored a range of potential impacts of climate change on the selection of resources, greenhouse gas emissions, and costs (See page 68 2023 IRP Appendix 5 – Analysis Results).

The 2023 IRP findings showed that climate change impacts on the load projections are expected to be modest and therefore this analysis was not repeated for the 2025 IRP.

However, the 2025 IRP will include a climate change sensitivity as it relates to water flow conditions.

Greenhouse Gas Emissions & Net-Zero

How are greenhouse gas emissions predicted to change between now and 2050? What is the status of the assumption to use direct air capture to reduce overall emissions?

The IRP considers the Government of Manitoba's Affordable Energy Plan, which targets a path to net-zero emissions for the Manitoba economy by 2050. All scenarios and sensitivities studied in the 2025 IRP were based on assumptions that resulted in a decrease in Manitoba's economy-wide emissions by 2050. Where the analysis was focused on a net-zero economy by 2050, remaining emissions are assumed to be netted to zero through negative emissions activities, of which direct air capture serves as a proxy that represents one possible option to net emissions to zero. This is done because not all of Manitoba's emissions can be reduced through different energy choices, and thus are beyond Manitoba Hydro's scope or ability to influence.

To request accessible formats visit hydro.mb.ca/accessibility.

Electric Vehicles (EVs)

How is the IRP addressing the expected growth in electric vehicle (EV) adoption and its impact on peak demand?

For each of the load projections in the IRP, we have a base set of assumptions on EV adoption rates and the associated energy use projection. We consider equipment peak and federal mandates for EV adoption, including Canada's Electric Vehicle Availability Standard. From a peak demand perspective, because the use of EVs is distributed throughout the year, there is no concentrated impact on the peak demand. See slides 34 and 35 of the Technical Advisory Committee Fall 2024 – Meeting 2 presentation for more information.

Integrated Resource Plan Engagement

Did the Round 1 residential survey track responses from rural versus urban respondents?

The residential survey included an optional question asking respondents to provide their postal code. The postal codes were mapped back to Manitoba Hydro customer service districts to better understand the distribution of survey responses throughout the province. This analysis demonstrated that survey responses were received from all service districts with the following distribution Winnipeg, 62%, South Central 13%, Eastman 14%, Parkland West 5%, and Interlake North 7%. The survey was intended to be a broad public engagement with the goal of hearing from as wide an audience as possible, and reporting of the results from the residential survey was not weighted to reflect the specific regional characteristics of our customer base.

Evaluation Metrics

This section focuses on questions related to the evaluation process within the IRP.

Does the IRP include a cost breakdown of environmental and social impacts?

Environmental and socio-economic impacts are not quantitatively considered in modelling, therefore we do not include a detailed cost breakdown. Environmental and socio-economic impacts are included in the evaluation metrics which are used during analysis of potential development plans that is done after modelling.

Imports & Exports

Is the IRP sensitive to recent trade conversations with the United States, in particular Canada's desire to connect power grids east/west across provinces?

The IRP does not go into this detail; however, it provides the planning context, including opportunities and challenges, that will support further discussions that explore trade with utilities in other jurisdictions.

Load Projections

This section focuses on questions related to the proposed load projections which were developed to evaluate a broad range of future electricity and natural gas demand up to the year 2050.

What are primary drivers of electrical load growth?

The primary drivers of electrical load growth are the assumptions around decarbonization of space heating, transportation, and other

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sectors by switching to electricity fueled technologies. These assumptions align with the goal of achieving a net-zero economy by 2050.

When will the load/demand exceed the current supply?

Manitoba will need new capacity resources in 2029/30. New dependable energy resources will be needed in 2030/31.

Did the load projections consider differences between rural and urban centres?

The load projections were considered on a regional level, then incorporated into a provincial level analysis.

Reconciliation

How do you plan to address socio and economic reconciliation in the North while looking toward enhancing capacity on the Nelson River?

Reconciliation is a foundational value at Manitoba Hydro and Manitoba Hydro is committed to respecting and supporting Indigenous peoples in all aspects of our business. This includes working collaboratively with Indigenous communities to address the adverse impacts of our existing projects and operations, as well as working together and providing timely and meaningful engagement and communications on future projects as they are identified.

Resource Options

This section focuses on questions related to the resource options used by Manitoba Hydro to meet future energy needs.

How are resources that take longer than 10 years to develop being considered for selection after 2035, beyond the 10-year scope of the recommended development plan? Are there any resources that look promising after 2035?

Six resource options were identified as viable to be considered in potential development plans for the 2025 IRP. The IRP's near-term actions will likely include the need to further investigate and consider resources with development timelines longer than 10 years. These resources will be further considered in the next IRP, and it is then we will gain more information about which resources best address Manitoba's energy needs after 2035.

Does the IRP consider how the resource projects will be sited regionally?

No, decisions about project location will happen during the planning process for each individual project.

Is it preferable to overbuild, or underbuild resources?

The risk of underbuilding is greater than the risk of overbuilding. There are many steps to developing a resource that take a significant amount of time, including planning, regulatory approvals, design, procurement, and construction. It's easier to slow down the project development process than to speed it up. We heard through engagement that reliability is important to Manitobans; it is important to be a step ahead of when resources are needed to maintain system reliability.

Efficiency Manitoba Plan Projection

How are building codes that improve energy efficiency being considered in the

IRP? And how will changes to the building code be considered into the future?

Efficiency Manitoba provided Manitoba Hydro with a long-term projection of electric and natural gas savings, based on its current Efficiency Plan Projection to achieve their legislated targets. This long-term projection considered energy efficiency from codes and standards assumed to reduce demand for electricity and natural gas, including building codes. The Efficiency Manitoba forecast of electric and natural gas savings was subtracted from the load forecasts for all scenarios considered in the IRP.

Looking into the future, the IRP roadmap will include signposts, which are external influences that we monitor for changes that may impact our energy planning. One of the signposts is government actions, which includes energy policy and standards, like changes to building codes.

Additional Energy Efficiency Programs

Who is responsible for advancing demand response programs?

The development of demand response programs is a joint effort between Manitoba Hydro and Efficiency Manitoba.

How have the impacts of demand response been modelled?

The IRP considers target energy savings that could be achieved from demand response that were provided by a third-party consultant who completed market potential studies.

If an industrial customer is interested in learning more about demand response programs, who should they contact?

If your organization has a customer service representative from Manitoba Hydro, that's the first point of contact. If you don't, please send a message to IRP@hydro.mb.ca and we'll put you in touch with the right team.

Have you modelled the 100% conversion of electrical resistance heating to geothermal/ground source heat pumps to reduce electrical load?

We analyzed the conversion of electric resistance heating to geothermal/ground source heat pumps and found it's not an economically viable choice in the near term, but may be viable in the future. It will continue to be evaluated in subsequent IRPs along with other potential resources.

Is district heating cost effective for new/ greenfield communities, particularly when compared to switching from gas to electric resistance space heating?

Installing district heating in new/ greenfield communities is typically more cost-effective than installing in existing (brownfield) communities with established gas infrastructure due to the costs of stranded assets and complexity of constructing around established infrastructure.

Manitoba Hydro has limited data to assess the performance, costs, and implications of installing district heating systems in brownfield versus greenfield installations. We are working with third-party consultants to better understand the implications of district heating systems and how we could support both individual and large-scale district systems in the future. This includes exploring the potential for smaller pilot opportunities for district ground-source heat pumps, including through existing energy efficiency programs.

Utility Scale Battery Storage (Short-Term)

Can batteries improve the effectiveness and viability of solar and wind generation?

While other utilities have success using batteries to store energy so it can be used later during peak demand, it is a less viable option on the Manitoba Hydro system for a few reasons.

The first consideration is that batteries can effectively provide shorter term energy storage that can be used a few hours or days later; they cannot effectively store energy in one season to be used in a different season. When considering the Manitoba context, the energy produced in the summer, when it is most plentiful, cannot be stored for use in the winter, when it is most needed.

Another consideration is that our system is limited in how much energy storage can be added. Manitoba Hydro already benefits from significant energy storage through its water reservoirs. This existing capability influences how compatible, or beneficial battery storage is within our system. Planned improvements to large hydrogeneration stations will further reduce the capacity to effectively add battery storage. Battery storage may also compete with other peak demand reduction strategies, such as demand response and curtailable rates programs, which could limit it how much battery storage can be effectively added to our system.

There is limited effectiveness of batteries combined with wind and solar on a winter peaking system. Modelling showed that energy is most needed in the winter during cold snaps and peak demand. Solar energy generation is lower during these times. For wind energy, there can be multiday periods with not enough wind to recharge the batteries. Batteries are most effective when providing a few hours of energy storage to be used a few hours or days later; and the potential reductions in energy production mentioned above impact the ability to charge batteries.

Enhancements to Existing Hydropower

What enhancements to existing hydrogeneration are being considered?

A detailed summary of the options for enhancing existing hydrogeneration stations will be included in the IRP. Potential enhancements that have been identified include the replacement of outdated generating units at Pointe du Bois Generating Station and the uprating of existing generating units along the lower Nelson River, namely the Long Spruce and Kettle Generating Stations.

Combustion Turbines

How much greenhouse gas emissions do you estimate being released from operation of natural gas fuelled combustion turbines?

Greenhouse gas emissions from the operation of natural gas combustion turbines will depend on specifications of the turbines that are installed and will vary from year to year depending on when and how often peak demand conditions occur. At this time, we estimate that, on average, 20,000 to 40,000 tonnes of CO^2e will be released per year, which is not much more than we are currently releasing. Beyond 2035, all combustion turbines GHG emissions are assumed to be netted to zero.

What are the potential regulatory risks associated with natural gas fuelled combustion turbines?

Natural gas fuelled combustion turbines will be operated on an as needed basis, during times of peak demand as a dispatchable capacity resource, which is within the requirements of current Clean Electricity Regulations. There is little regulatory risk associated with natural gas fuelled combustion turbines.

How is biomethane/renewable natural gas (RNG) considered in the IRP?

Biomethane, also known as renewable natural gas, is an alternative fuel that can be burned in combustion turbines instead of conventional natural gas. We consider a wide range of biomethane fuel sources, including from producers in Manitoba, however there is currently insufficient local supply to fuel a large generating unit. We do not assume that 100% RNG would be burned directly in a combustion turbine because that would require a separate transmission and storage system. Instead, we assume RNG will be blended in the existing natural gas distribution system and the environmental benefits will be accounted for with credits.

How are hydrogen combustion turbines considered in the IRP, including the potential of Manitoba Hydro producing hydrogen?

While turbines that are 100% fuelled by hydrogen are currently not available in the market for purchase, the IRP analysis considered the concept of hydrogen combustion turbines operating solely on hydrogen fuel with an in-service date after 2035. The concept includes generating hydrogen using electricity during times of surplus, which is then stored and used later in times of peak demand.

Solar

Can solar energy generated during low flow/drought conditions reduce demand on large hydrogeneration and support recharge of the reservoirs?

Having resources other than hydrogeneration, like solar, producing energy when we are experiencing low flow or drought conditions can be valuable; however, we must also consider that we will not always be experiencing low flow conditions. During high flow conditions, these other sources of energy would be in surplus which could lead to curtailing (turning off the generators) or exporting the energy produced on the spot market. Exported energy on the spot market is of less value than energy used in Manitoba, so we must consider the return on investment of all resources and how the energy produced is used.

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How is energy produced by private residential and commercial, behind the meter solar installations considered in the IRP?

The energy generated by private, behind the meter solar is considered in Efficiency Manitoba's forecast of electric savings, which are then subtracted from Manitoba Hydro's load projections used in the IRP analysis.

Small Modular Nuclear Reactors

How do you consider the regulatory environment when considering small modular nuclear reactors?

There are no operational small modular nuclear reactors in Canada, so there is significant uncertainty about the regulatory environment and what will be required to get the necessary approvals to build and operate this resource type. This uncertainty translates to an assumed development timeline that is greater than 10 years.

Changes in the regulatory environment for small modular nuclear reactors will continue to be monitored as part of the IRP's signposts.

Biomass Fuelled Steam Turbine with Carbon Capture

How is biomass generation with carbon capture and storage (BECCS), and the associated carbon credits, considered in the IRP?

Bioenergy with carbon capture and storage was considered in the modelling with an earliest in-service date of 2035. It was not deemed a feasible resource to be included in the 10-year recommended development plan, but it will continue to be considered as part of the near-term actions and in the next IRP. Carbon credits from the operation of BECCS can offset emissions from natural gas combustion turbines and support a net-zero grid.

Transmission And Distribution

How are upgrades to the transmission and distribution system considered in the IRP?

The IRP process focuses on demand growth and the required resources to serve it. It assumes that the transmission and distribution system is maintained and expanded to serve the actions in the recommended development plan. Required maintenance and expansion of the transmission and distribution system is accomplished through existing processes outside of the IRP.

Links

- 2023 IRP Appendix 5 – Analysis Results (climate risk – page 68): https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-a5-analysis-results.pdf#page=68
- Slides 34 and 35 of the Technical Advisory Committee Fall 2024 – Meeting 2 presentation: https://www.hydro.mb.ca/docs/corporate/irp/2025-irp-tac-meeting-2-deck-for-web-v0525.pdf#page=34
- Six resource options: https://www.hydro.mb.ca/docs/corporate/irp/6-irp-resource-options-v0725.pdf

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2.11. IP Round 2 Presentation and Information Handouts

This section includes the following materials:

- Information Handout: *Six resource options available for development plans to 2035*
- Presentation: Round 2 Engagement - 2025 IRP Road Map

2025 Integrated Resource Plan

Round 2 Engagement – Fall 2025
2025 IRP Road Map

To request accessible formats visit hydro.mb.ca/accessibility.

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Land acknowledgment

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.

Agenda

Purpose:

Share our road map for Manitoba's energy future and hear your insights and feedback.

Topics:

1. Purpose of today's engagement
2. Introduction
3. Road Map
   - Recommended development plan and the resources included
   - Alternative development plan
   - Learnings
   - Near-term actions
   - Signposts
4. Next steps for the 2025 IRP

Purpose of today's engagement

We want to hear your thoughts on our 2025 IRP road map

- **The road map** outlines steps we need to take to ensure we're ready for the energy future.
  - **Share** our **recommended development plan** focused on meeting energy needs over the next **ten years** – provided for awareness and understanding.
  - **Gather your feedback** on how we move forward together on our **near-term actions** to be completed over the next **five years**.
  - Identify any additional **indicators or signposts** that might help identify **changes in the energy landscape**.
- Share next steps that will occur after the IRP is finalized.

Welcome!

Introductions

- Name & organization

Meeting Reminders

- Please mute during the presentation
- Questions? Post in the chat or raise hand
- Check-ins & discussion points throughout

Introduction

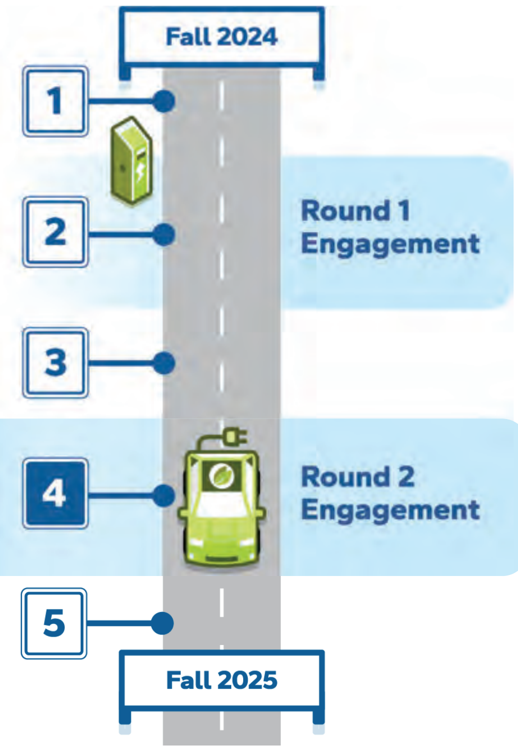
A brief introduction to the 2025 Integrated Resource Plan

The 2025 IRP process

Our journey since fall 2024

★ – we are here

1. Setting direction
2. Developing key inputs and scenarios
3. Modelling, analysis, and evaluations
4. ★ Making a preliminary recommendation
5. Finalizing the Integrated Resource Plan



Road map

The steps we need to take to ensure we're ready for the energy future

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.

Recommended Development Plan

The Recommended Development Plan:

- Is a high-level plan for the combination and quantity of investments needed to 2035 – **what investments** are needed **by when** and **in what quantities** to meet Manitoba's energy needs;
- Meets requirements for a net-zero grid by 2035 and net-zero economy in Manitoba by 2050.

It is **not**:

- A **standalone strategy for reaching a net-zero economy** in 2050;
- A **commitment to building** any major new facilities;
- A plan with **project-specific details**, like construction locations or timelines;
- A **solution for all Affordable Energy Plan mandates or directives;**
- An **exhaustive list of all investments Manitoba Hydro must make** to effectively serve future energy needs.

Recommended Development Plan meets the 2025 IRP objectives

This 10-year Recommended Development Plan:

- **Meets Manitoba's future energy needs**, including capacity for peak demand and a continuous supply of energy;
- **Considers trade-offs of factors important to Manitobans** – reliability, cost, environmental and socio-economic impacts;
- Provides **flexibility for meeting load growth** and considers risks to new and existing supply;
- **Enables a net-zero grid by 2035 and a pathway to a Manitoba net-zero economy by 2050;** and
- Aligns with Manitoba's **Affordable Energy Plan.**

2025 IRP road map

Recommended Development Plan

$3.4B capital investment to add approx. 1,760 MW accredited capacity by 2035; meets net-zero requirements by 2035; supports a pathway to a net-zero economy by 2050

Resources added under the plan:

- **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*** by 2035;
- **Enhancements to existing hydropower** to achieve a minimum **25 MW** of capacity by 2029;
- **Battery storage of approx. 5 MW** by 2034 to test performance and integration;
- **Natural gas/biomethane fuelled combustion turbines** totalling **750 MW** by 2030.

Capital Investment Cost by 2035: **$3.4B**

Greenhouse Gas Impacts:

- Maintains more than 99.8% **non-fossil-based** electricity generation (on average).
- Compliant with Federal **Clean Electricity Regulations**.

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

Additional non-generation investments, specific to the IRP, to enable resources and future system development:

- **Electrical transmission and distribution upgrades** (not including HVDC or sustainment activities);
- **Gas supply and distribution upgrades** to support new natural gas generation (not including sustainment activities or improvement capital).

Recommended Development Plan

Approx. Accredited capacity (MW) by 2035

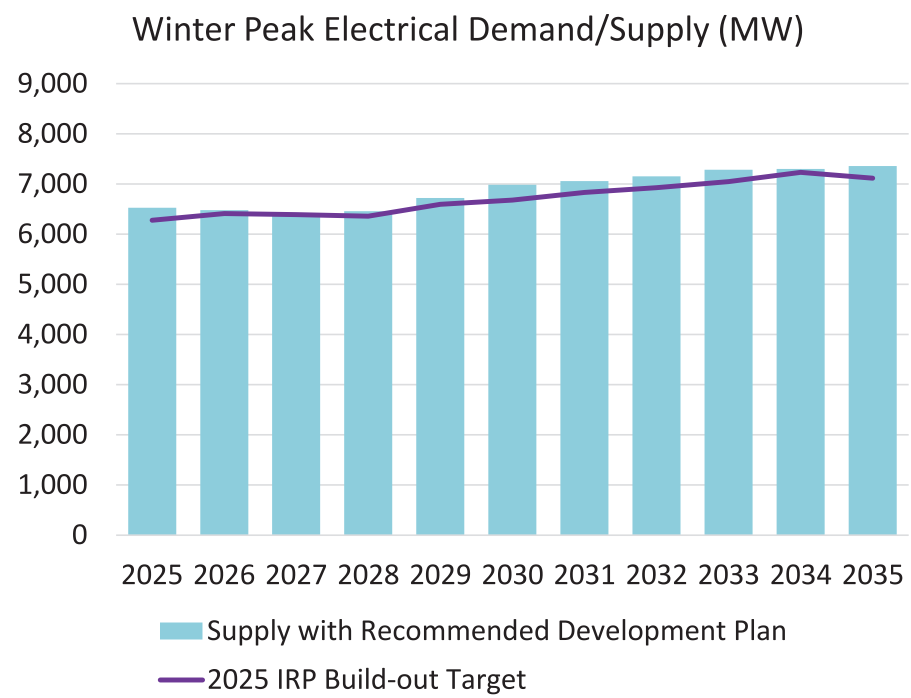
Feasible Resource Options	Recommended Development Plan
Efficiency Plan Projection	450
Demand Response Including Curtailable Rate Program	310
Additional Energy Efficiency Programs	100
Total Customer Side Solutions	860
Wind*	120
Battery Storage	5
Enhancements to Existing Hydropower	25
Combustion Turbine fuelled by Natural Gas/ Biomethane	750
TOTAL	**1 760**

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

- **Efficiency programs, demand response and curtailable rate programs** account for approx. 50% of total accredited capacity.
  - Achieving these resources' capacity goals relies on customer uptake.
- Combustion turbines intended to serve **peak demand** and operate as a backstop during periods of **drought, extreme weather**, or other **system contingencies.**

Manitoba needs to catch up to (and stay ahead of) the energy transition

- Manitoba has a **capacity need date of 2029/30** – limited capacity can be added before this date.
- Established **build-out target and carried out a risk analysis** to ensure reliability. The build-out target mirrors:
  - The 2024 Electric Load Forecast from 2025 to 2029.
  - The 2025 IRP Load Projection 2 from 2029 to 2035.
- The build-out target and risk analysis helps to balance not building enough (inadequate supply) versus building too much (not enough demand).



Recommended Development Plan

Each resource plays a role, and each will be used differently

The following slides outline in brief:

- **How each resource fits** into the recommended development plan—including how they will be used;
- **Key considerations about the resource**.

Energy Efficiency Programs

Includes the efficiency plan projection and additional programs designed to reduce demand for capacity by 450 MW and 100 MW respectively by 2035

How it fits into the plan

- **Reduces demand for capacity**, deferring the capacity we need to serve with other resources.
- **Efficiency-first approach** aligns with Affordable Energy Plan objectives.
- Includes **450 MW of capacity** savings associated with the efficiency plan projection extended to 2035 and introduces **100 MW of additional energy efficiency** programming.

Key considerations

- Achieving reductions requires **voluntary and significant customer uptake**.
- **Efficiency Manitoba needs time** to develop new programming.
- We will need to **monitor performance** of efficiency programming in meeting target demand reductions.

What does the 100 MW of additional energy efficiency programming include?

- Additional home insulation measures;
- Support for ground source heat pump installations;
- Thermal energy storage;
- Custom solutions for industrial customers.

Demand Response and Curtailable Rates Programs

Includes solutions targeting **310 MW** of reduced demand for capacity by 2035

How it fits into the plan

- Helps **reduce the peak capacity** we need to serve.
- **Efficiency-first approach** aligns with Affordable Energy Plan objectives.

Key considerations

- Achieving the reduction in demand for capacity requires **voluntary and sustained customer uptake**.
- Realizing full capacity savings requires **new capabilities, technologies, and tools** (e.g. Distributed Energy Resource Management System [DERMS]; advanced metering infrastructure [AMI, or smart meters]; and new rate structures).
- We will need to **monitor progress** on design, uptake, and effectiveness of programs.

How is Demand Response different from Energy Efficiency Programs?

- Demand Response creates **short duration capacity savings** by reducing peaks.
- Energy efficiency programs provide **overall reductions in energy** use.

Wind

Includes **600 MW** wind power **by 2035**

How it fits into the plan

- Provides **low-cost energy.**
- **Aligns with the Affordable Energy Plan** objective to pursue Indigenous majority-owned wind.
- Provides **opportunities for socioeconomic benefits,** including economic reconciliation.

Key considerations

- Wind's variable nature means it must be **complemented with dispatchable capacity resources.**
- Manitoba Hydro has **conducted and published a high-level wind exploratory study** to inform procurement and eventual interconnection processes within Manitoba Hydro.
- Timelines and project specifics are dependent on procurement processes and project proponents.

Wind's accredited capacity

- Wind is a **variable resource**. Studies have shown up to **20% of installed capacity** will be available during winter peaks.
- This means **600 MW** of installed wind is **accredited at 120 MW**.

See Manitoba Hydro - Call for power: Indigenous majority-owned wind

Enhancements to Existing Hydropower

Includes supply-side enhancements aiming to achieve **25 MW** of capacity by 2029.

How it fits into the plan

- **Adds capacity** with no additional footprint.
- **Aligns with the Affordable Energy Plan** objective to increase capacity through refurbishments.

Key considerations

- There is potential for **up to 180 additional MW** being investigated for economic viability.
- Enhancements will be planned with other maintenance/overhaul work **to maximize economic viability.**

What are Supply-side Enhancements?

- Modifications and/or repowering to existing hydroelectric generating stations that serve to increase capacity.
- For example, Manitoba Hydro's Pointe du Bois Renewable Energy Project that includes replacing/upgrading generating units.

Short-term Utility-scale Battery Storage

Includes battery storage of approx. **5 MW** by 2034

How it fits into the plan

- Provides a source of **dispatchable capacity**.
- Piloting of approx. 5 MW will help **test effectiveness** in Manitoba and help us **understand potential benefits** of future, larger installations.

Key considerations

- Manitoba Hydro **already has significant energy storage** through existing water reservoirs, which may impact the compatibility and benefits of battery storage.
- Batteries **may compete with other resources that reduce peak demand**, like demand response and curtailable rates programs, potentially limiting their usefulness.

Short-term batteries can help with short-term needs

- Providing 10 hours of charge or less, short-duration batteries can help integrate wind and other variable sources.
- Longer-duration batteries are less mature and more costly but would be needed for prolonged events like cold snaps.

Natural Gas*/Biomethane-Fuelled Combustion Turbines

Includes projects totalling **750 MW** by 2030

How it fits into the plan

- Is a **reliable, dispatchable capacity resource** ideal for **serving peak demand**.
- Three units of approx. 250 MW each provide **enough capacity to meet current and future firm demand** requirements until 2035.
- Meant for **year-round reliability—not every-day energy**.

Key considerations

- Manitoba Hydro must **maintain a minimum level of capacity** to ensure reliability.
- As they are in high demand globally, Manitoba Hydro is proactively **securing manufacturing slots** to maintain our place in the procurement queue.
- Any combustion turbines will have the option to **run on renewable fuels** as they become available.

*"Natural gas" refers to natural gas, synthetic natural gas, and/or biomethane.

Emissions impacts

- Based on current system planning and modelling, any combustion turbine is expected to operate infrequently – primarily to serve peak demand and as a backstop during periods of drought, extreme weather, or during other system contingencies.
- Running combustion turbines fuelled by natural gas/biomethane at the modelled frequency would have very little impact on Manitoba's emissions.

Why 750 MW of Natural Gas Combustion Turbines?

Creates contingency critical for reliability and much more for our province

1. **It supports reliability**
   - Enables integration of intermittent renewables such as wind and helps mitigates risks like aging HVDC infrastructure.
   - Allows for consistent service of existing system even during droughts, extreme weather, or other system challenges.
2. **It's cost-effective**
   - Plans with fewer combustion turbines are more expensive.
   - After maximizing energy efficiency and demand response, combustion turbines are the lowest-cost dispatchable resource.
3. **It contributes to decarbonization and economic growth**
   - Combustion turbines are a key part of the recommended development plan that supports Manitoba's transition to a net-zero economy by 2050 and additional economic development opportunities.
4. **It can be deployed quickly**
   - Combustion turbines can be built and deployed to provide capacity needed as soon as 2030.

Alternative Development Plan

Lower cost but offers fewer socio-economic benefits than recommended development plan; includes more wind, more CTs, and less efficiency programming

Feasible Resource Options	Recommended Development Plan	Alternative Development Plan
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
Wind*	120	140
Battery Storage	5	5
Enhancements to Existing Hydropower	25	0
Combustion Turbine fuelled by Natural Gas/Biomethane	750	850
TOTAL	**1 760**	**1 760**

*120 MW of accredited capacity of wind is equivalent to 600 MW of installed wind; 140 MW accredited is equivalent to 700 MW installed

Why we recommend this development plan

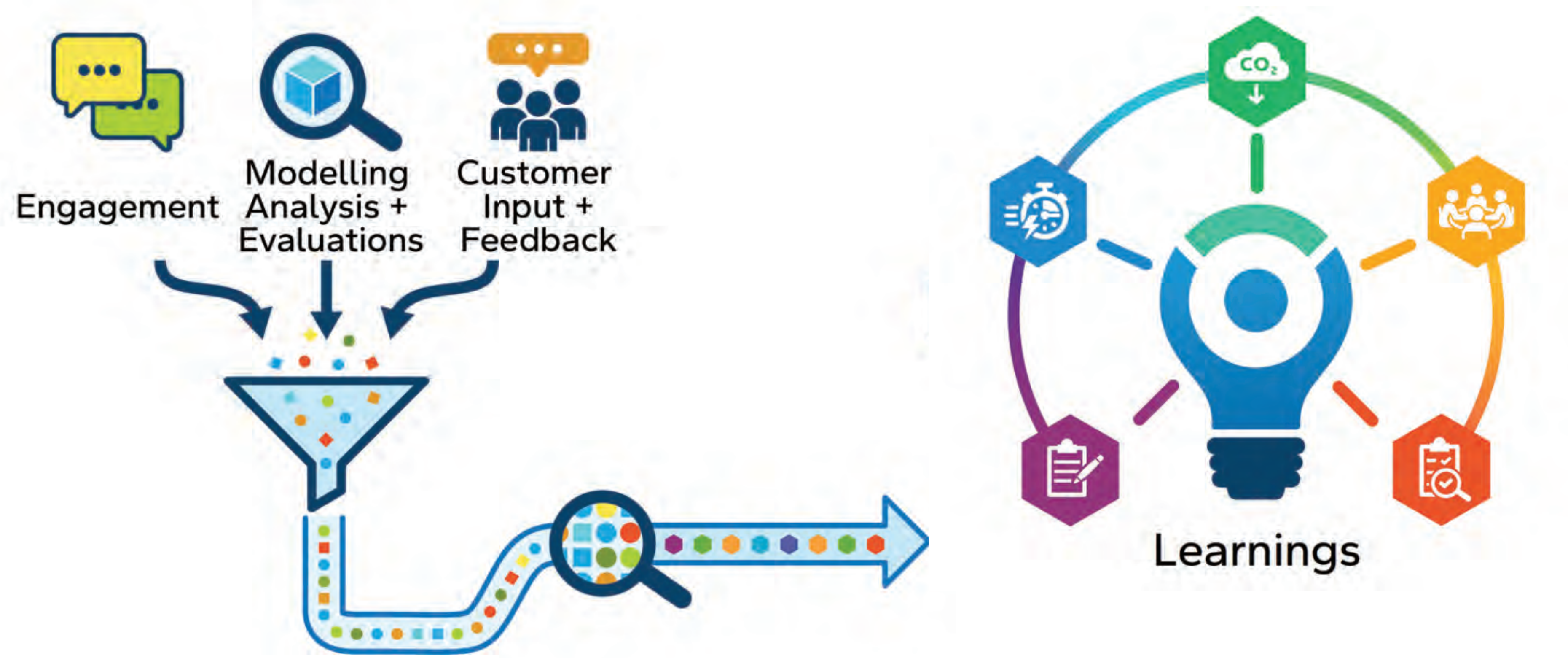
The recommended plan offers:

- A **lower overall risk profile**;
- A **better balance** between factors important to Manitobans, offering **greater opportunities for socio-economic benefits** than offered by the alternative development plan;
- Among the **lowest cost plans;**
- Better **alignment with government directives** for Manitoba Hydro, including more energy efficiency programming and enhancements to existing hydropower assets.

Discussion

- What's making sense? What's not?
- Do you have questions on the recommended or alternative development plans?
- Is there anything you were surprised to see or not see in the recommended development plan?
- Is there anything you want to understand better?

What are learnings?



Learnings

Key takeaways from the process

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 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 2029/30 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.

Near-term Actions (NTAs)

To be completed over the next 5 years

Near-term actions 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.

There are two NTA themes:

Theme 1: Implement the development plan.

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

NTA 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.
5. Implement the **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.

NTA Theme 2: Prepare for the next IRP and continue ongoing planning

8. Monitor the **development plan implementation and load growth** to guide resource adjustments (e.g., tracking energy efficiency, resource project schedules, and supply-demand balance).
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.

Manitoba Hydro supports the energy transition

To support the NTAs and ongoing planning, we will…

- Continue to **build alignment** with the Province of Manitoba, Efficiency Manitoba, the Public Utilities Board, customers and Interested Parties.
- **Provide information and analysis** to support policy decisions, including supporting a vision for Manitoba Hydro's role in a net-zero future.
- **Continue to communicate** with Interested Parties to **share outcomes and learnings** from the 2025 IRP.
- **Provide resources and information** to allow customers to make **informed energy choices** that support a managed energy transition.
- **Support the advancement of economic reconciliation** in our interactions with Indigenous peoples and nations.

What are Signposts?

Signposts:

- Indicate the type, timing, pace, and magnitude of change in the energy landscape.
- Inform implementation of near-term actions and development plans.
- Will be monitored, reported on, and incorporated into IRP analysis to understand when changes to underlying IRP assumptions are significant enough to warrant another IRP.
- Reflect many things that will be monitored for risk of implementing the development plan.

Signposts

How we recognize change in the energy landscape

We identified three signposts as having the largest impact on the demand and supply of energy.

Discussion

- What's making sense? What's not?
- Do you have questions on the learnings, near term actions or signposts?
- Is there anything you were surprised to see or not see in the learnings, near term actions or signposts?
- Is there anything you want to understand better?
- Are there any near-term actions that you are particularly interested in? How do you see yourself collaborating on these near-term actions?

Next steps

Next Steps for the 2025 IRP and Beyond

For the 2025 IRP:

- Complete Round 2 Engagement and share what we heard.
- Finalize and submit 2025 IRP to Government for approval.
- Anticipate government will refer the 2025 IRP and the recommended development plan to PUB for review.
- Implement development plan.
- Pursue project-specific approvals, as appropriate. (e.g., some projects may require a *Major New Facilities Review* by the Public Utilities Board, or review under the *Environment Act*.)

Beyond the 2025 IRP:

- Execute near-term actions.
- Monitor landscape, especially signposts.
- Update IRP analysis in between IRPs.
- Continue conversations with the energy planning community.
- Prepare for the next IRP – likely to launch within three years.

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

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2.12. IP Round 2 Participation Summary

Participants	Date	Attendance
Interested Parties and Government of Manitoba Departments	December 11, 2025	38
Interested Parties and Government of Manitoba Departments	December 15, 2025	52
TOTAL		**90**

Indigenous Nations, municipalities, and interested parties represented at Interested Parties Sessions:

Acorn Hill Partners Inc.
AECOM
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Assiniboine Community College
Association of Consulting Engineers
AtkinsRéalis
BizforClimate
Brandon Chamber of Commerce
Business Council of Manitoba
Canadian Centre for Policy Alternatives
City of Brandon - Sustainability
City of Dauphin
City of Portage La Prairie
City of Winkler
City of Winnipeg
Climate Action Team
Climate Change Connection
Efficiency Manitoba
Electranix Corporation
Electric Power Research Institute
Electrical Contractors Association of Manitoba
Evolve Energy Inc.
Government of Manitoba – Expert Advisory Council
Graham Construction and Engineering
Green Action Centre
International Institute of Sustainable Development
International PV Development Co.
MakeWay Charitable Society
Manitoba Contractors Association of Manitoba
Manitoba Energy Justice Coalition

Manitoba Home Builders Association
Manitoba Industrial Power Users Group
Manitoba Métis Federation
Manitoba Sustainable Energy Association
Manitoba Trucking Association
March Consulting Associates Ltd.
Mikkelsen Coward
Narratives Inc.
Project Blue World
Red River College Polytechnic
Rural Manitoba Economic Development Corporation
Rural Municipality of Victoria
SANDGEO Inc.
Southern Chiefs Organization
Stantec Consulting Ltd.
Sustainable Building Manitoba
Town of Neepawa
Town of Stonewall
University of Manitoba
University of Winnipeg
Winnipeg Economic Development and Tourism
Winnipeg Metropolitan Region
WSP

2.13. IP Round 2 Questions and Answers Summary

The Round 2 Interested Parties Questions and Answers Summary will be provided in supplemental reporting.

3. Indigenous Nations Leadership

The leadership of First Nations, First Nations organizations, and the Manitoba Métis Federation were engaged to better understand the existing operations and future energy needs of Indigenous Nations. The following information is provided in this section:

- 3.1. First Nations Leadership
  - 3.1.1. Engagement Process Summary
  - 3.1.2. Survey Promotional Postcard
  - 3.1.3. Round 1 Survey Report
  - 3.1.4. Round 2 Survey Report
- 3.2. Manitoba Métis Federation Leadership
  - 3.2.1. Engagement Process Summary
  - 3.2.2. Engagement Feedback Summary

3.1. First Nations Leadership

3.1.1. First Nations Leadership Engagement Process Summary

Initial engagement with First Nations leadership for the 2025 IRP occurred through First Nations Organizations. In August 2024, introductory letters were sent by Manitoba Hydro's incoming CEO to the Assembly of Manitoba Chiefs (AMC), Southern Chiefs' Organization (SCO), and Manitoba Keewatinowi Okimakanak (MKO). In these letters, Manitoba Hydro offered to host introductory leader-to-leader meetings with each organization.

In October 2024, AMC, MKO, and SCO were invited to join the Technical Advisory Committee. MKO accepted the invitation and subsequently became a member of the TAC. These three organizations were also invited to the broader Interested Parties engagement opportunities, along with several other Indigenous organizations. As work on the 2025 IRP progressed, Manitoba Hydro continued to extend invitations to Interested Parties Sessions.

AMC initially indicated they planned to participate in the TAC, then subsequently let Manitoba Hydro know they would not be participating at the time. Manitoba Hydro noted that, while AMC's perspective would be a welcome one at the TAC, an alternate engagement approach could be pursued, further described below.

Manitoba Hydro was invited by AMC to speak to First Nations leaders at the AMC Energy & Climate Gathering that took place on November 13, 2024. Manitoba Hydro's CEO and other senior energy planning staff attended and presented at this gathering and were available for a question-and-answer session. The 2025 IRP First Nations leadership survey was launched at this event, and postcards with a link to the survey were distributed to attendees. Following the AMC Gathering, we also distributed the First Nations Leadership Survey to leadership of the 63 First Nations in Manitoba via email and hard copy letter.

Several respondents to the survey expressed interest in participating in future engagement sessions, being included in future energy planning processes, and learning more about different energy-related topics. Respondents indicated a preference for in-person meetings and presentations as their preferred engagement method. Based on this feedback, an Energy Planning Workshop was developed and is now part of Manitoba Hydro's ongoing engagement with interested Indigenous Nations.

The Energy Planning Workshops provide an opportunity for further engagement on the 2025 IRP, as well as broader energy planning topics of interest. These workshops bring together members from several Manitoba Hydro departments to share information, receive feedback, and answer questions on topics including:

- Manitoba Hydro's IRP engagement process, explaining the IRP outcomes, seeking feedback on the next steps and ongoing engagement opportunities.

- General information on energy resources of interest to the Nation, and discussion of the customer-owned generation interconnections process.
- The existing suite of Manitoba Hydro affordability programs, including seeking feedback from leadership on potential barriers to these programs and ideas for alternative approaches.
- The Nations' broad energy goals, including high-level conceptual feedback on potential future programs and projects (e.g. generation, time-of-use incentives, district geothermal, etc.).
- The Electrical Service Application process, including discussion of the Nations' current and upcoming building plans and estimated timelines.

IRP engagement included seeking feedback on the economic reconciliation evaluation metric that was included in the IRP development process. In December 2024, Manitoba Hydro reached out to the AMC to seek feedback on the proposed Economic Reconciliation metric. AMC indicated that they would not be participating in this component of the IRP at that time.

As a result of ongoing leadership dialogue between AMC and Manitoba Hydro, Manitoba Hydro and AMC signed an agreement in June 2025 for Manitoba Hydro to fund a liaison position at the AMC to facilitate engagement with AMC and AMC member Nations on broad policy issues, including integrated resource planning.

3.1.2. First Nations Leadership Survey Promotional Postcard

Let's talk about our energy future.

Share your thoughts about energy planning

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Help us understand your community's future energy needs

The world of energy is changing.

Share your ideas around energy planning and your community's goals, and help inform our energy future.

Our survey for First Nations leaders is available until **January 15**, or reach out to us directly at: **irp@hydro.mb.ca**

Share your thoughts

hydro.mb.ca/future/feedback/leader

To request accessible formats visit hydro.mb.ca/accessibility.

3.1.3. First Nations Leadership Round 1 Survey Report

Fall 2024 Customer Insights

First Nations Leaders – Energy Planning Survey

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This section presents the key findings from First Nations Leaders – Energy Planning Survey that was open from November 13, 2024 to January 15, 2025.

The insights gathered provide an overview of energy futures being considered by those who responded to the survey (11 respondents) regarding their communities' goals and existing operations, highlighting trends, common themes, and conclusions.

Key Findings

- Energy goals are focused on self-generation and energy efficiency opportunities. Reasons for this included environmental considerations, a desire to be self-sufficient, emergency planning and to lower costs for community members.
- Concerns about caring for the environment while meeting energy demands.
- The importance of system reliability in rural and remote areas. Improving existing service connections to minimize future outages.
- Need for more energy related information and resources.
- Desire to work in partnership with Manitoba Hydro to plan future needs and explore alternative energy sources.

Survey Participants

Which of the following best describes your community?

- The community has access to the Manitoba Hydro electric grid (9)
- The community is located in an off-grid area (2)

Which of the following best describes your role?

- Employee (5)
- Chief or Councillor (4)
- Did not identify their role (2)

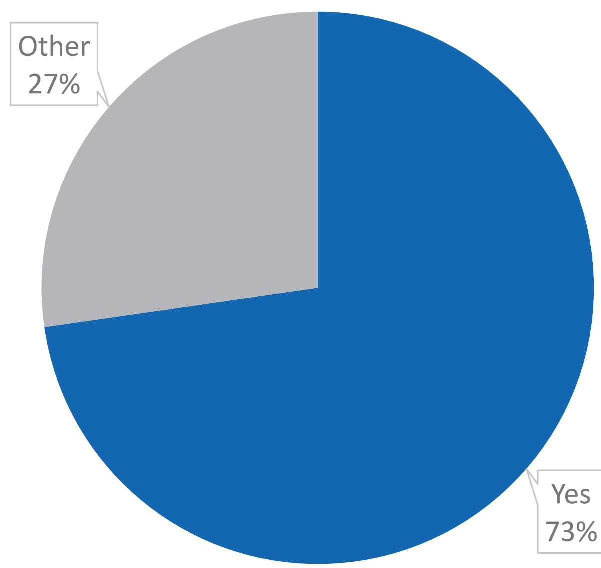
N=11/11

At a high level, what are your community's energy goals? (Open text)

- Electricity, wind farm, and solar, and emergency generation options
- Low-cost energy
- To consume as little hydro energy as possible, move towards green energy
- Solar power
- To be energy self sufficient

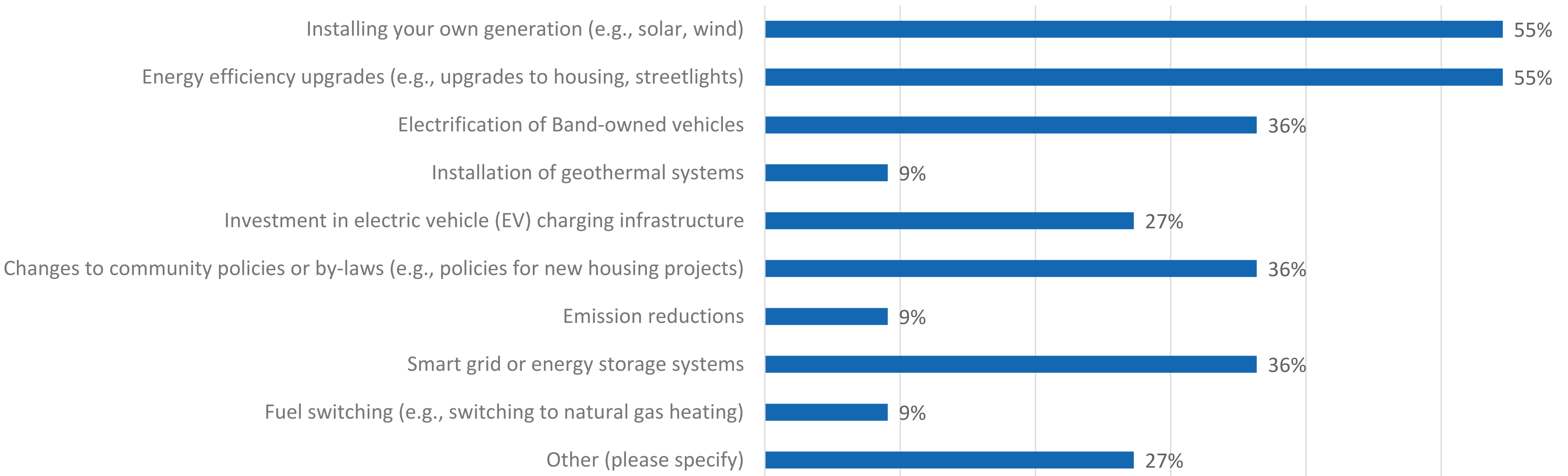
N=5/11

Thinking about your community's current energy use, do you anticipate any significant changes in your needs over the next 10 years? (e.g., as a result of major expansions, economic development, etc.) (Multiple choice: yes, no, other - open text)



N=11/11

Is your community considering any of the below energy-related changes in the next 10 years? (Multiple Choice – select all that apply)



Other: Nuclear generators

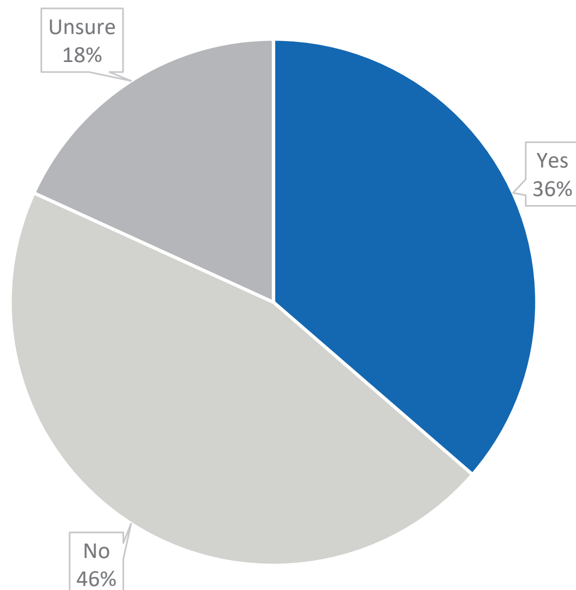
N=11/11

What factors are influencing the potential changes you are considering (e.g., government regulations and policies, climate and environmental factors, community member interest, etc?)

(Open text)

- Cost is the primary factor for us with climate change that seems to be affecting our community
- Governments regulations, and community members interests
- Community member interest, financials
- Funding is the biggest factor
- All of the above

Does your community have any emission reduction or energy efficiency targets or commitments? (Multiple choice: Yes, No, Unsure)

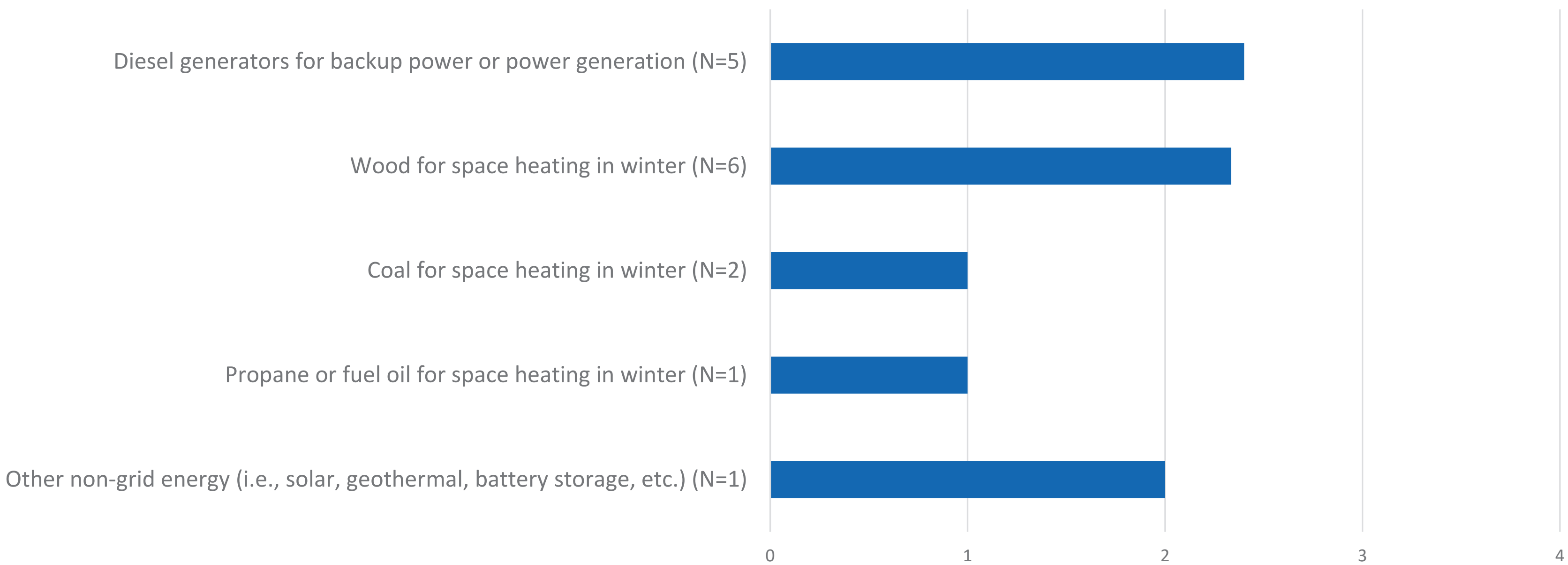


N=11/11

- Yes: *Net-zero emissions by building nuclear reactors*

Thinking about your community – including buildings, homes, and businesses – please rate the usage of the following energy sources.

Rating Scale:
0 = Never used
3 = Sometimes used
5 = Used often



10

What else should MH know about your energy needs or planning?

(Open text)

"working in partnership with hydro to plan our future needs"

"To ensure the rates we are paying is the same rates as other Manitobans."

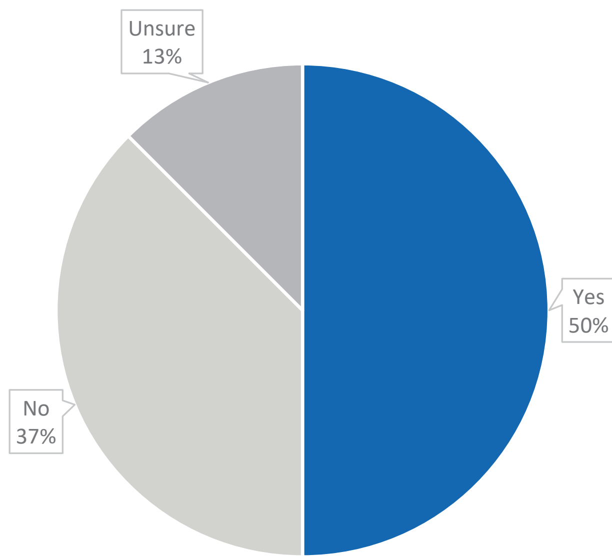
"Our energy needs are basic utilities such as streetlights, we are very interest in nuclear power."

"we are served a single hydro line into our community and would like to see a improved line as we've been affected by numerous outages from forest fires/winter storms/thunderstorms etc. as we are a remote fly-in community."

"We need to know more information and be provided resources"

N=3

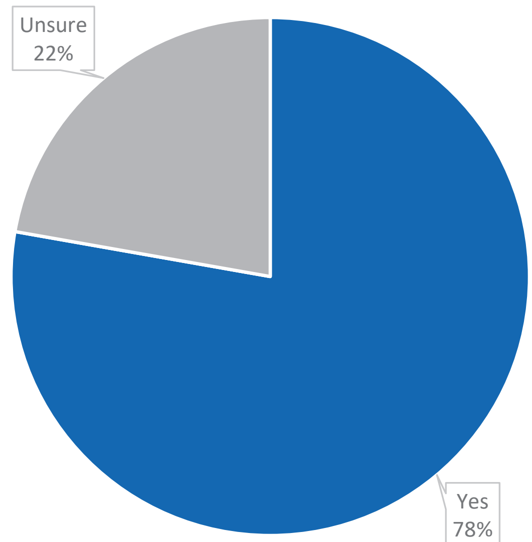
Manitoba Hydro is exploring options to promote energy conservation during high-demand times. This could include programs to compensate customers who voluntarily shift their electricity use, such as lowering their thermostats by a few degrees during high-demand times.
Would your community be interested in learning more about and potentially participating in these types of programs? (Multiple Choice: Yes, No, Unsure)



N=9

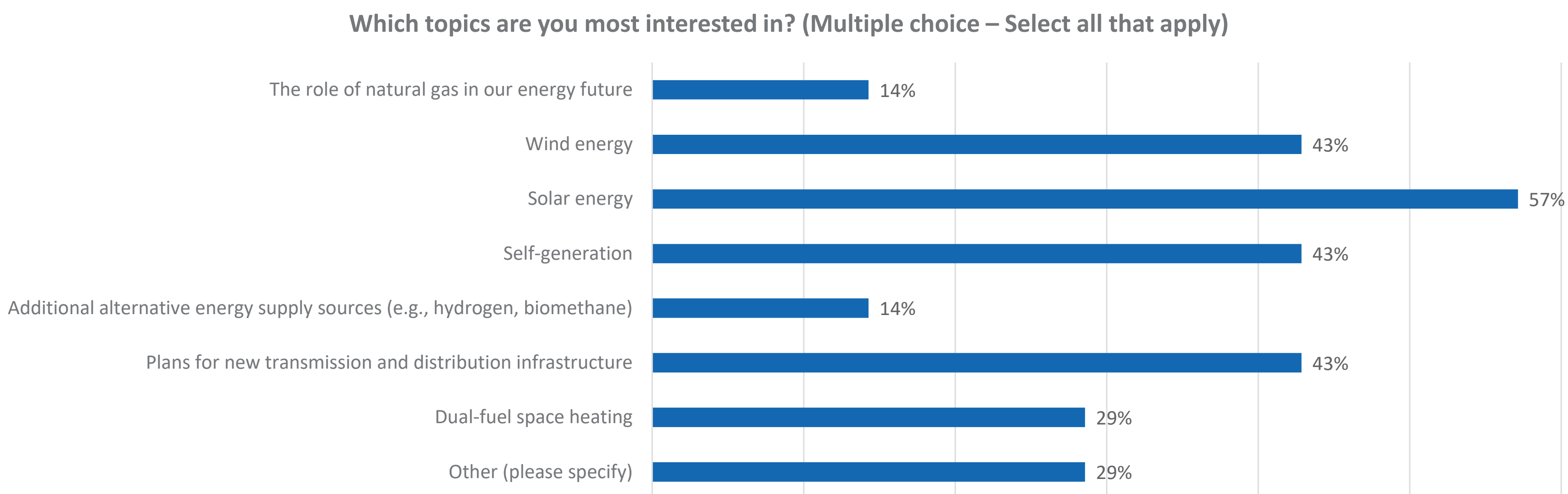
The Government of Manitoba released the Manitoba Affordable Energy Plan, which includes a key action for Manitoba Hydro to issue an Expression of Interest for near-term wind generating projects with Indigenous majority ownership for up to 600 MW of power.

Would your nation like to stay informed of this procurement effort? (Multiple choice: Yes, No, Unsure)



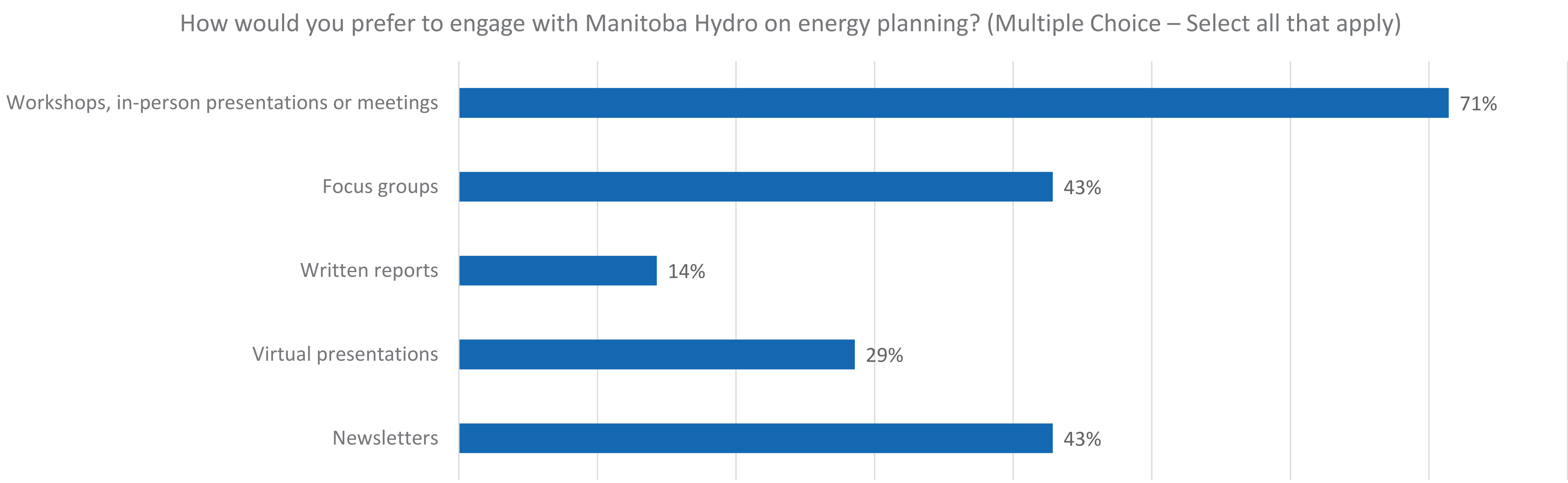
N=9

Interest in Energy Planning



N=7

Future Engagement



N=7

Additional Comments

"Taking care of our natural resources - Mother Earth and animals."

"We need to push green energy, and possibly somehow ensure that we will always have hydro, our community in 2019 was without hydro for 2 weeks […] two weeks in November, the only thing that saved some of our People is that the weather was mild during that time, if it was below 10 degrees even we would have lost people."

"I can see First Nations heading the nuclear program to restore our land and coexist with nature while meeting the high demand for energy."

N=3

3.1.4. First Nations Leadership Round 2 Survey Report

The Round 2 First Nations Leadership Survey Report will be provided in supplemental reporting.

3.2. Manitoba Métis Federation (MMF) Leadership

3.2.1. MMF Engagement Process Summary

Manitoba Hydro engaged with the Manitoba Métis Federation as the representative government of the Red River Métis. Engagement for the 2025 IRP was initiated at the leadership level.

In August 2024, an introductory letter was sent by Manitoba Hydro's incoming CEO to the President of the Manitoba Métis Federation. In this letter, Manitoba Hydro offered to host an introductory leader-to-leader meeting, which was held in September 2024.

The Manitoba Métis Federation was invited to participate on the Technical Advisory Committee and in Interested Parties workshops. MMF accepted the TAC invitation, identified representatives, and subsequently became a member of the TAC. MMF was invited to Interested Parties Sessions throughout the IRP.

Part of the IRP engagement process included interviews with Manitoba Métis Federation leadership and staff selected identified by leadership. These interviews were conducted on Manitoba Hydro's behalf by the engagement consultant, Urban Systems Ltd. The process was initiated during Round 1 of IRP engagement. Interview topics included energy planning goals and activities, as well as seeking feedback related to the Economic Reconciliation evaluation metric. The consultant reached out through email to leadership and/or identified staff to arrange the interviews.

The interviews were scheduled for approximately one hour and were guided by questions developed for the MMF. The engagement consultant took notes to document the interview conversation.

Interviews with leadership regarding energy planning goals and activities are ongoing. Once these interviews are completed, the engagement consultant will prepare a key findings document that will summarize the interviews. This document will be provided to the MMF for review and to confirm accuracy.

3.2.2. MMF Engagement Feedback Summary

The preparation of summaries of the engagement activities with the Manitoba Métis Federation is ongoing.

4. Large Industrial Customers

Insights were gathered from large industrial customers to provide an overview of energy futures being considered related to their Manitoba operations. Customers were contacted directly with the support of their Energy Service Advisor and responded to a survey or an interview based on their preference. The following information is provided in the subsequent sub-sections:

- 4.1. Engagement Process Summary
- 4.2. Interview and Survey Questions
- 4.3. Research Report

4.1. Large Industrial Customers Engagement Process Summary

Manitoba Hydro Key account customers were engaged to:

- Understand if, when, and how intensive energy users are thinking about fuel switching and/or electrification strategies over the next 25 years that could inform future load impacts.
- Gain an understanding of how intensive energy users would adapt to a proposed net-zero economy by 2050 and how they may be able to influence the assumptions and inputs.
- Receive feedback from key accounts about critical service elements and opportunities for improvement.

Participants were provided with the option to participate through either:

- Moderated, semi-structured interviews conducted via Microsoft Teams. The Integrated Resource Planning Policy & Coordination team led each interview with support from other Manitoba Hydro departments; or
- Electronic questionnaire was distributed to customers allowing them to complete it at their convenience.

Interviews were conducted between November 7 and December 2, 2024. The survey was open to customers from December 5 to December 19, 2024. 15 large industrial customers participated in the survey and interviews.

4.2. Large Industrial Customers Interview and Survey Questions

1. What are your largest sources of electricity use & natural gas use in your operations (space heating, process loads, feedstock, etc.)?

2. Do you use energy other than electricity or natural gas?

3. What changes are you anticipating in energy usage?
    a. What is influencing you to make those changes?
    b. If you don't foresee any change, could anything change that view?
    c. Can you share any details about how much more or less electricity and/or natural gas you may need?
    d. When do you expect your energy needs may significantly change?

4. Does your company have any emission reduction targets/commitments?
    a. What are your targets/commitments?
    b. Are any actions planned to meet those targets/commitments?

5. Who, if anyone outside your organization is influencing your energy choice decisions?

6. Thinking about when your electricity and/or natural gas needs may change in Manitoba, are there factors that could speed up those plans?
    a. On the flip side, are there any factors that could delay those plans?

7. As part of Manitoba Hydro's 2025 Integrated Resource Plan, we are modelling a broad range of future scenarios, including a future scenario where Manitoba Hydro must have enough energy to supply a net-zero economy.
    a. Has your organization considered carbon neutral or net-zero futures?
    b. If not, how might your organizations energy consumption change? What would your organization need to do?
    c. This is your opportunity to provide us insight into what you see in a potential net-zero future and to influence the 2025 Integrated Resource Plan scenario development. Do you have any additional thoughts or information?

8. Is there anything you thought I would ask but I didn't?

9. Do you have any questions for me, or anything more to add?

4.3. Large Industrial Customers Research Report

2025 Integrated Resource Plan
Fall 2024 Research
With Select Customers & Organizations

To request accessible formats visit hydro.mb.ca/accessibility.

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Table of Contents

Topics

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Key Findings

- This section presents the key findings from our customer engagement during November 7 to December 19, 2024. The insights gathered provide an overview of energy futures being considered by 15 large industrial customers to their Manitoba operations, highlighting trends, common themes, and conclusions.

Customers expect to use more electricity in the future

Key Finding 1

What we heard:

Since our last engagement during the 2023 IRP, more industrial customers are publishing Environmental, Social, and Governance (ESG) reports and setting emission reduction targets. This reflects a growing commitment to sustainability and environmental responsibility.

Details:

- 12 out of the 15 we engaged have set emission reduction targets. Some plan to achieve their goals by 2030.
- 11 out of the 15 we engaged plan to use more electricity in the future. Some businesses, including some of Manitoba Hydro's largest natural gas users, plan to achieve their decarbonization goals by way of electrification (specifically communicating the value of Manitoba's renewable hydroelectric supply), while most stated they anticipate load growth due to anticipated market growth.
- Despite efforts to improve energy efficiency, many anticipate needing more energy in the future.
- The transition to electric fleets vehicles is anticipated to contribute to future energy use as part of decarbonization initiatives. However, widespread adoption of electric vehicles may take time as businesses assess the market availability and feasibility within their Manitoba operations. Per our customers, factors such as infrastructure readiness, cost implications, and technological advancements play important roles in determining the pace of this transition.

Carbon pricing remains a key driver influencing decisions

Key Finding 2

What we heard:

Carbon pricing remains a key driver shaping investment decisions. Many businesses are taking action or developing plans to meet corporate emissions reductions goals, including prioritizing energy efficiency to help offset emissions.

Details:

- Businesses are continuing to factor carbon pricing into their cost management strategies and investing in energy-efficient technologies in a cost-effective manner. Due to the upfront costs of upgrading to energy-efficient technology, many are opting to wait until existing equipment reaches end of life before making changes. This approach allows them to plan future emission reduction measures while managing financial impacts.

Actions towards achieving a net-zero economy are becoming more prevalent

Key Finding 3

What we heard:

Customers are increasingly committing to achieving net-zero emissions by 2050 (or sooner), aligning their targets with frameworks outlined by the Federal Output-Based Pricing System (OBPS) or other science-based targets.

Details:

- 5 of the 15 we engaged have set public net-zero targets to be achieved by 2050.
- 5 of the 15 we engaged have set science-based targets, aiming to reduce greenhouse gas emissions (GHGs).
- 7 of the 15 we engaged participate in the Federal Output-Based Pricing System (OBPS)[1].
- Many customers have stated they plan to transition away from non-renewable power sources in the future; however, there aren't any current plans for self-generation or back-up supply (e.g., wind, solar, etc.).
- Some customers have conducted feasibility studies on energy storage and carbon capture & storage but decided not to proceed with implementation.
- Energy efficiency remains an important measure to reduce emissions and consumption. Many customers are exploring the adoption of new, energy-efficient technologies.

[1] In the Canadian Output-Based Pricing system, some customers are required by law to participate due to exceeding certain GHG emission thresholds, while some customers opted to voluntarily participate in the OBPS rather than the consumer-facing Federal Carbon Charge.

Energy rates and reliability matter most

Key Finding 4

What we heard:

Customers shared that utilities can significantly impact business decisions, specifically as the low price of energy can be beneficial for keeping operational costs manageable. However, low energy prices may also delay the motivation to invest in energy-efficient or renewable technologies. This is particularly true of business-to-business (B2B) companies, which tend to sell a commodity product and compete on price.

Details:

- Participants value reliability and spoke to the benefits of ensuring operational stability and productivity. This is particularly vital to some businesses using electricity or natural gas as a feedstock, which serves as a critical input.
- Energy prices remain a consideration for customers. Specifically, Manitoba's low electricity price may influence decision-making regarding operational changes around existing carbon-emitting systems, therefore influencing the speed of transition.
- Of those who mentioned environmental and social aspects, identified these as areas likely to be influenced by regulations, rather than factors currently driving their decision-making. All were unrelated to their energy future decisions.

Conclusions from Conversations with Large Industrial Customers

- The research confirms that **customers are considering a range of energy futures**, each influenced by external factors, drivers of change, and the realization of emission target-setting. **The three planning assumptions and eight proposed scenarios accurately capture** the most influential factors and the range of futures that Manitoba Hydro should plan for.
- **The assumptions in medium and high load projections reflect what we heard from many customers** as they begin implementing various emission reduction initiatives. **These customers remain strongly influenced by carbon pricing.** Some have commenced plans for change while others continue to monitor and will adapt when the economics warrant it.

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Motivations & Prioritization

- This section presents the drivers of change, customer assumptions and expectations, pace of change, and influential factors shared by participants.

Drivers of Change

1. **Carbon Pricing**

   Is the most common driver of change. Nearly every participant stated the increasing carbon tax will have an impact on their energy choices or for those without plans to change, is something that they continue to monitor.

2. **Energy Efficiency**

   Businesses increasingly recognized energy efficiency as an initial step towards reducing emissions. The approach is embedded within operational planning, where cost-effective reduction strategies are linked with energy efficiency.

3. **Corporate Commitments**

   Several participants expect to reduce their consumption of fossil fuels, either through electrification or other renewable resources (to a lesser extent), adhering to their emission reduction commitments.

4. **Technology Adoption**

   Businesses are monitoring and exploring emerging and mature technology options to achieve various goals, notably related to their emission reduction commitments.

Drivers of Change

5. Regulatory Changes

Incentives and funding or tax implications for industries have a strong influence on decisions. Red tape and bureaucracy were also stated to impact decisions.

6. Market Opportunity & Trends

Influence the feasibility of options by shifting expectations and driving demand. An increased consumer preference on sustainability may drive certain choices, influencing businesses to prioritize on these options. However, economic conditions such as inflation or slowdowns can limit budgets and change priorities. The actions of competitors can force change as well.

7. Energy Prices

Businesses look to carefully evaluate utility prices and their impact on operations. When utility costs fluctuate, it complicates planning and budgeting and can become challenging to predict changes. Relocation decisions involve significant expenses, notably when leaving a region abundant in input resources, including higher procurement and transportation costs.

Pace of Change

Participants indicated these factors may speed up, delay, or change their future energy needs.

Participants shared several external factors that could influence change. We've categorized them into three common themes:

Utility Factors

Refers to the actions and services derived from the utility that affect business decisions.

Policy & Regulation Factors

Refers to combined influence of government guidelines and laws that shape and control actions within a given sector.

Market Factors

Refers to the variables affecting the level of a company's sales. Variables includes various market forces that impact the supply and demand for products produced by customers.

Pace of Change

Utility Factors

- **Energy Prices:** Change in the price of electricity, natural gas, renewable natural gas, bio-energy, and carbon capture will influence the speed of any future energy transition.
- **Electrical Interconnection:** Those who plan to increase electrical usage, need certainty on the lead time required to access additional electrical capacity as it can result in significant impacts. Longer or unexpected delays in lead times can delay plans, hindering their ability to meet their targets.

Pace of Change

Policy and Regulatory Factors

- **Government Investment:** Businesses rely on federal and provincial funding to support the energy transition including investments in studies, technology adoption projects, and implementation of sustainable practices.
- **Carbon Pricing System:** Impacts the energy choices of nearly every participant, particularly a progressively escalating carbon price.
- **Policy Shifts:** Related to the Paris Agreement[1] and net-zero goals[2] influence businesses to adjust their commitments. As more businesses work towards achieving net-zero emissions, they may need to implement changes over time to align with evolving standards and requirements.
- **New Regulations:** Require adjustments to operations and impact future energy requirements, demand for products, and EV fleet adoption.

[1] https://www.canada.ca/en/environment-climate-change/services/climate-change/paris-agreement.html
[2] https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html

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Pace of Change

Market Factors

Market Fluctuations: As new technologies gain traction, businesses expect increased demand for raw materials, which are abundant in Manitoba. This anticipated increase in demand will boost business operations, benefitting both B2B and B2C businesses. Alternatively, economic downturn or rising inflation could significantly impact consumer behaviour and business operations. Further, supply chain disruptions could lead to other instabilities.

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Customer Assumptions & Expectations

Key Assumptions on Participants Future Energy Needs with Manitoba Hydro

- **Carbon Price – Persistence & Escalation:** Participants who predicted significant changes to their energy use assume the carbon price will endure through government changes and other states of flux, and that it will continue to escalate up to $170/tonne by 2030.
- **Electrical Capacity Reliability:** Participants planning to electrify to reduce their GHG emissions assume and expect that Manitoba Hydro will ensure reliable and consistent access to renewable energy sources.
- **Electricity Rates:** Participants assume Manitoba Hydro will be able to reliably supply electricity at stable and affordable prices.
- **Electrical Interconnection Reliability:** For those increasing electrical usage, it is assumed that Manitoba Hydro's future infrastructure development will be completed within a reasonable timeline to support ongoing business changes and evolving market demands. Significant and unexpected lead time fluctuations could cause major disruptions to business operations.

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Motivation & Prioritization Conclusions

- Our research revealed that all seven drivers of change were evident across the diverse customers we engaged with, in different combinations and scale.
- Common themes such as carbon pricing, market opportunity, and energy efficiency emerged consistently.
- Certain drivers stood out as uniquely relevant to specific industries, highlighting the nuanced impact of industry-specific dynamics on behaviour and decision-making around their energy futures.

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Future Customer Energy Decisions

- This section presents an overview of likelihood of change and the implications.

Exploring the Likelihood of Change

What Large Energy Customers' Future May Hold

- No new plans for near-term changes were shared beyond what has already been communicated and submitted to Manitoba Hydro through formal channels of engagement and procedure.
- **More customers plan to decarbonize through electrification** than in our last engagement. Their main concern with electrification was around affordability. Despite this concern, some have already submitted plans to Manitoba Hydro.
- More customers are monitoring technology advancements and **assessing feasibility of fleet electrification**.
- Most projected changes in the amount or type of energy use are predicated on either **emission reductions plans** or demand changes to their respective product markets.
- Of the participants without established climate commitments, many had stated they had **efficiency targets to reduce their energy intensity** per unit produced.
- A couple of customers would like to gain **access to natural gas to reduce costs & emissions.**
- Unlike our last engagement, this time, **no customers openly shared about RNG plans; while others shared that they'd be monitoring how to turn byproducts into biofuels.**

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B2C Industry – Most Likely to Expect Change

Industrial businesses that sell direct to consumers (B2C) are more likely to shift their energy use, driven by emission reduction commitments, such as net-zero targets.

Electrification: Significantly more likely to be pursuing or expecting to electrify operations in the future.

Brand Equity: Given that they sold a branded product to consumers, these industrial producers can benefit (charging a premium or gaining more market share) from the positive perception of decarbonization versus those that sell an unbranded commodity to another business.

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B2B Industry – Least Likely to Expect Change

Business to business (B2B) industrials that produce a commodity or a product which is an input into producing another good are least likely to be forecasting significant changes in the type or amount of energy they use.

- **Little/No Brand Equity:** Products that are commodities or inputs for other businesses, most often compete on price. In this case, lowering the emission intensity of the product does not translate to a higher selling prices or increased market share; costs cannot be passed on.
- **Market Demand:** This group was more likely to state that their energy consumption was heavily influenced by demand for their commodity or local availability of the product they process.
- **Funding:** While both groups were interested in funding, this group was most interested receiving government support to accelerate and adopt emission reduction technologies into their business operations.
- **Energy Prices:** This group was most likely to indicate they are sensitive to energy prices.
- **Regulation:** Changes to energy use are often driven by changes to government regulations.

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Future Customer Energy Decisions Conclusions

- Adopting low-carbon practices is seen as a competitive advantage, particularly for businesses with strong marketability and direct consumer engagement (business-to-consumer or B2C).
- Businesses operating within supply chains (business-to-business or B2B) may find it more challenging to market these efforts directly.

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Additional Learnings & Reflections

Customer Experience & Service Findings

Need for Reliable Service	**Interconnection Timelines:** Some customers state that long lead times in obtaining the electrical service they require have delayed projects. One customer shared challenges around information flow between departments at Manitoba Hydro and back to the customer.
	Power Quality & Reliability: Reliability can have an outsized impact on some customers' operations. Generally, customers were satisfied with Manitoba Hydro's response.
Need for Increased Transparency	**Rate Increase Projections:** Customers expressed interest in understanding Manitoba Hydro's forecast rate increases, in percentages, over the next 10 years to support future business planning.
	Inspections: Customers with geographically diverse operations (within Manitoba) noted inconsistent practice and interpretation of codes.
Building and Maintaining Relationships	**Trusted Advisor:** Customers consistently highlighted the responsiveness, expertise, and advocacy provided by their account representatives throughout project lifecycles (e.g., infrastructure) and ongoing operational support. Notably, customers referenced their reps by name, emphasizing the value of a knowledgeable, engaged point of contact.

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Engagement Overview

- Research Approach, Participation, and Anticipated Outcomes

25

Who Did We Engage With and Why?

Select Customers & Organizations

- Engage our key account customers in a meaningful conversation, demonstrating our care and consultation.
- Understand if, when, and how intensive energy users are thinking about fuel switching and/or electrification strategies over the next 25 years that could inform future load impacts.
- Gain an understanding of how intensive energy users would adapt to a proposed net-zero economy by 2050 and how they may be able to influence the assumptions and inputs.
- Receive feedback from key accounts about critical service elements and opportunities for improvement.

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Engagement Overview

Participants were provided the option to participate in the research through either:

- Moderated, semi-structured interviews conducted via Microsoft Teams. The Integrated Resource Planning Policy & Coordination team led each interview with support from Customer Data, Analytics & Research and Customer Energy Services staff; or
- Electronic questionnaire was distributed by Customer Energy Services to their customers allowing them to complete at their convenience.

Engagement Period

- Interviews were conducted between November 7 and December 2, 2024. The survey was open to customers from December 5 to December 19, 2024.

Manitoba Hydro
energy for life

Manitoba Hydro is developing an Integrated Resource Plan to meet the future electricity and natural gas needs of customers.

As one of our largest customers, we're reaching out to understand any expected changes in your organization's energy use over the next 10 to 25 years and the factors driving those changes.

This survey will help inform our understanding of what the future holds for your organization's energy needs and should take approximately 10 to 15 minutes to complete. Your responses will remain anonymous, and any publicly reported data will be combined to protect your privacy.

Thank you for taking the time to share your thoughts.

Who's Listening

The Customer Energy Services and Energy Planning Teams at Manitoba Hydro

What Did We Want To Know?

Research Objectives

- Determine whether a major change should be anticipated.
- Understand what's motivating these anticipated changes (e.g., decarbonization, economics, etc.) and if the changes are contingent on certain assumptions (e.g., government funding, a rising GHG price, financing, and energy rates, etc.).
- Understand what may drive changes to happen earlier or later than planned.
- Understand the business customer's plans and considerations for a net-zero economy.
- Reflect key learnings in IRP scenarios and sensitivities and other planning activities.
- Identify current service improvement opportunities with our key account customers and explore key service touch points (e.g., reliability, cost, and communication).
- Onboard additional customers to the IRP distribution list.

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Anticipated Outcomes

Using the Research Process and Findings to Achieve Key Objectives

- Confirm key planning assumptions in electric and natural gas load forecast.
- Inform development of key inputs and scenarios for the Integrated Resource Plan.
- Foster meaningful engagements to build trusted advisor relationships with our customers.

20 additional large customer representatives signed up to the IRP subscriber list for more information on energy planning and updates on Manitoba Hydro's 2025 Integrated Resource Plan.

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5. Municipal Leadership and Administration

Insights were gathered from municipal administrators and leaders to provide an overview of energy futures being considered by municipalities and to better understand communities' goals, existing and future operations and energy needs. The following information is provided in the subsequent sub-sections:

- 5.1. Engagement Process Summary
- 5.2. Survey Questions / Guiding Questions for Interviews
- 5.3. Survey Promotional Postcard
- 5.4. Survey and Interview Report

5.1. Municipal Engagement Process Summary

The municipal survey was first promoted using postcards distributed in person at the Association of Manitoba Municipalities Convention on November 25, 2025. Following the event, a survey link was emailed directly to every municipal CAO and administration office in Manitoba. The survey was completed by 21 respondents representing 18 municipalities.

The engagement consultant also reached out directly to select municipalities to arrange interviews with municipal administration. Ten municipalities were invited to participate in interviews and 6 municipalities participated. Attendance at the interviews included Chief Administrative Officers, and/or staff representing engineering, climate change, economic development and planning departments.

Interviews were conducted by the engagement consultant by telephone or MS Teams. A representative from Manitoba Hydro joined as an observer when available. The interviews were about 1 hour and were guided by questions from the municipal survey.

5.2. Municipal Survey Questions / Guiding Questions for Interviews

1. Which municipality, town, or village do you represent?

2. What are the first three characters of your postal code?

3. What is your name, position title, and organization?

4. Manitoba Hydro is exploring future energy scenarios to ensure we can meet the future energy needs of Manitobans. Has your municipality been planning for the energy future, including the possibility of a net-zero future by 2050?
   a) Yes (If yes, go to questions 5-10)
   b) No (If no, skip to question 7)
   c) Unsure

5. What are the key goals for your energy plans? (Select all that apply)
   a) Reducing greenhouse gas emissions
   b) Improving energy efficiency
   c) Reducing energy costs
   d) Increasing energy security and reliability
   e) Supporting community growth and development
   f) Other (please specify)

6. Are there any factors that could speed up or delay your municipality's future energy plans?
   For example, changes in electricity and natural gas rates, increases or decreases in carbon price, availability of funding or financing, shifts in market condition, or government policies. (Each selection below has option to select, 'Speed up' or 'Delay')
   a) Climate and Environmental Factors
   b) Funding and Financial Incentives
   c) Public Opinion and Community Engagement
   d) Government Regulations and Policies
   e) Other (open-text)

7. Thinking about your municipality's current energy use, do you anticipate any significant changes in your community's future energy needs?
   a) Yes
   b) No (If yes, go to question 8)

8. What energy-related changes is your municipality considering? (Select all that apply)

a) Installing your own generation (e.g., solar, wind)
b) Energy efficiency upgrades (e.g., buildings, streetlights)
c) Electrification of municipal fleet vehicles
d) Investment in public EV charging infrastructure
e) Policy or by-law changes
f) Integrating biomethane (also known as renewable natural gas)
g) Emission reductions
h) Smart grid or energy storage systems
i) Other (please specify)

9. When does your municipality expect these changes?

a) Over the next 5 years
b) 5-10 years
c) 10-15 years
d) 15- 20 years
e) 20+ years and later

10. What is influencing these changes?

a) Climate and Environmental Factors
b) Funding and Financial Incentives
c) Public Opinion and Community Engagement
d) Government Regulations and Policies
e) Other (open-text)

11. Does your municipality have any emission reduction targets or commitments?

a) Yes (If yes)
  - What are your targets? (e.g., reduce GHG emissions by X% by year)
  - What actions are planned to meet these targets?
  - Is the plan publicly available?

b) No

12. What is your municipality's largest sources of natural gas and electricity use in your operations?

a) Cooling (air conditioning or refrigeration)
b) Process loads (water and waste)
c) Space heating
d) Transportation or fleet operations
e) Unsure
f) Other

13. Has your municipality considered the future role of natural gas in meeting your community's energy needs?
   a) Yes (If yes, go to question 14)
   b) No
   c) Not sure

14. Is your municipality planning to expand, reduce, or shift away from natural gas?
   a) Expand
   b) Shift away
   c) Reduce
   d) Natural gas is not available in our area
   e) Other (please specify)

15. Do you have any additional comments or feedback regarding your municipality's energy transition, energy plans, or any other topics we may not have covered?

16. Many factors will be considered in the 2025 Integrated Resource Plan as we evaluate future energy options in Manitoba. When you think about your community, how important do you think each of the factors below is for Manitoba Hydro to consider?
(Scale: Very Important, Somewhat important, Somewhat unimportant, Not at all important, Don't know)
   a) Reducing greenhouse gas emissions
   b) Protecting the environment
   c) Minimizing the frequency and length of outages
   d) Reducing new infrastructure costs
   e) Minimizing customer rate impacts
   f) Promoting economic development

17. What other factors does your municipality think should be considered as we make future energy decisions? (open-text)

18. Manitoba Hydro will have to make choices and prioritize factors as we plan for our future energy options. Help us understand how you think Manitoba Hydro should prioritize the same factors you just rated. Allocate 100 points among the factors based on how important you think they are in relation to each other.

(Note: More important factors should receive more points than less important ones. You don't have to give all the items listed below points but you do have to use up all your 100 points.)

a) Reducing greenhouse gas emissions
b) Protecting the environment
c) Minimizing the frequency and length of outages
d) Reducing new infrastructure costs
e) Minimizing customer rate impacts
f) Promoting economic development
g) Don't know

19. Tell us more about how you chose your priorities. What were you considering as you decided how to allocate your points? (open-text)

20. Would you like to learn more about energy planning in Manitoba and participate in future engagement opportunities.

a) Yes (if yes, go to question 21)
b) No, not at this time

21. Please enter your email address to stay updated on energy planning and future engagement opportunities.[open-text]

5.3. Municipal Survey Promotional Postcard

Tell us about your community.

Share your thoughts

Manitoba Hydro
energy for life

Help us understand your community's future needs

The world of energy is changing and we all have a part to play in our energy future.

Our survey is available until **December 19** asking questions related to decisions on energy use and what matters to you when it comes to your energy.

Your answers will help inform our energy future.

Share your thoughts

hydro.mb.ca/future/feedback/community

To request accessible formats visit hydro.mb.ca/accessibility.

5.4. Municipal Survey and Interview Report

2025 INTEGRATED RESOURCE PLAN MUNICIPALITY INSIGHTS

Municipal Survey and Interviews

URBAN SYSTEMS

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TOPICS

URBAN SYSTEMS

SCOPE

- Understand if, when and why municipalities are thinking about fuel switching and/or electrification strategies over the next ~20 years that could inform future load impacts.
- Gain an understanding of how municipalities would adapt to a proposed net-zero economy by 2050, not only as an energy user, but also as a governing body. How they may be able to influence the assumptions and inputs: would they or are they considering by-law changes, what can or cannot be done in this regard; have they considered incentives or programs to encourage certain outcomes.

RESEARCH GOALS

- Review existing municipal electrification strategies for municipalities
- Connect with municipalities whether they anticipate major changes in the type, source or quantity of energy they may use in their operations over the next ~20 years
- Understand what's motivating these anticipated changes (e.g. decarbonization, economics, etc.) and if changes are contingent on certain assumptions (e.g. government funding, a rising GHG price, financing and energy rates, etc.)
- Understand, what may drive changes to happen earlier or later than planned.
- Reflect key learnings in IRP scenarios and sensitivities and other planning activities.

URBAN SYSTEMS

This section presents the key findings from our customer engagement during November 13, 2024 to January 15, 2025. The insights gathered provide an overview of energy futures being considered by representatives from 24 municipalities.

SUMMARY KEY FINDINGS

- Industrial uses, municipal facilities, and space heating and cooling are the largest sources and users of natural gas and electricity in most municipalities.
- System reliability and enhancements to minimize outages are important, especially in rural and northern Manitoba. The provision of affordable energy options is a key priority for municipalities.
- Some municipalities are seeing interest in small-scale solar, wind and geothermal development.
- Many municipalities want to maintain or expand natural gas in their communities.
- Many municipalities are planning expansions or new construction of facilities to support service delivery and manage recent and anticipated growth. Due to current funding limitations, they cannot always consider energy efficiency in designs in quite the same way they were in past projects.
- Municipal planning is starting to consider sustainability and efficiency, but communities are concerned about their ability to support a full transition to net-zero 2050. Policy changes and additional funding could help to speed up the energy transition.
- Municipalities who are experiencing more rapid growth are seeing increased demand for multi-family residential and industrial development. Municipalities want to be development-ready and are concerned about limitations to growth and expansion that could impact economic development.
- Municipalities have a strong desire to continue to engage and work in partnership with Manitoba Hydro to anticipate and plan for future development.

URBAN SYSTEMS

KEY FINDINGS

INDUSTRIAL USES AND MUNICIPAL OPERATIONS CONTINUE TO BE THE LARGEST SOURCES AND USERS OF NATURAL GAS AND ELECTRICITY

Participants shared that the largest sources and users of natural gas and electricity in communities include:

- **Large Industrial users** with heavier manufacturing processes using energy directly in production, and users with substantial space heating requirements.
- **City facilities** like arenas and recreation complexes (including ice plants), and water/wastewater treatment plants.
- **Multi-family development** in communities is experiencing growth, especially multi-family development.
- **Agricultural operations** including colonies and large-scale dairy farms, are significant users of natural gas for grain drying and biomass heating.

URBAN SYSTEMS

ELECTRICITY AND NATURAL GAS REMAIN THE PRIMARY ENERGY SOURCES IN MOST MUNICIPALITIES

Participants shared that the energy usage other than electricity or natural gas in their communities include:

- **Solar Energy:** Solar installations in some residential areas but no significant large-scale solar developments have been proposed. Solar on buildings is permitted in residential areas in all municipalities we spoke with.
- **Wind Energy:** A few business have proposed on-site wind generation for self-use and selling back to the grid. There is interest in wind energy, but space constraints often prevent full-scale development. Zoning regulations also limit the use of roof turbines and larger wind energy systems due to setback requirements, height restrictions, and other land-use considerations.
- **Geothermal Energy:** Geothermal energy is sometimes used in municipal recreation and operations facilities, but communities have experienced operational and maintenance challenges. There is interest in geothermal energy from developers, but land availability, freezing, soil and bedrock are limiting factors to larger/district geothermal energy development.

URBAN SYSTEMS

MUNICIPALITIES ARE ANTICIPATING CHANGES IN ENERGY NEEDS FOR THEIR OPERATIONS

Participants shared that the changes in energy needs for operations over the next 10 to 25 years may include:

- **Residential Growth and Development:** Many communities are expecting residential growth, primarily driven by new multi-family housing.
- **Infrastructure:** Water and wastewater treatment plants, public works shops and fire hall expansions in response to growth are expected to see significant increases in natural gas and electricity consumption.
- **Energy Efficiency and Retrofits:** Many communities are planning for energy efficiency retrofits and expansions to recreation facilities, libraries and operations buildings.
- **Geothermal and Renewable Energy:** There was minimal interest in geothermal in municipal facilities due to operations and maintenance concerns. There is interest in small-scale renewable energy projects like solar and wind at municipal facilities.
- **Electric Vehicles:** Some municipalities are gradually transitioning to zero-emission vehicles, with plans to acquire some fleet vehicles this year and chargers to support them.
- **Industrial Growth and Development:** Some communities are planning for significant industrial growth, adding hundreds of acres of new development in the short-term, including heavy manufacturing and wet industries.

URBAN SYSTEMS

MUNICIPALITIES ARE TAKING SOME STEPS TOWARDS TRANSITIONING TO MORE FUEL-EFFICIENT AND ELECTRIC VEHICLES

Participants shared that anticipated changes to fleet include:

- **Light-Duty Vehicles:** Municipalities have been discussing transitioning to zero-emission vehicles, where feasible. Some communities have used grants to purchase BEVs and PHEVs and charging infrastructure.
- **Planning Priorities:** Most communities do not have a formal fleet transition plan, but there is a desire to move towards more fuel-efficient vehicles. Councils are typically interested in the financial incentives and operating savings from reduced fuel consumption, while reducing emissions and carbon footprint is not often the main priority.
- **Heavy-Duty Vehicles:** Transitioning heavy-duty vehicles and equipment is not being considered due to cost, operations and maintenance requirements. While funding exists for vehicles like a handi-van, finding a supplier or feasible option is currently challenging.
- **Technology Advancements:** Hydrogen is preferred over electric for buses and trucks. Some communities are waiting for technology advancements, particularly Hydrogen for buses and other large equipment.

MUNICIPALITIES GENERALLY DO NOT HAVE SPECIFIC EMISSION REDUCTION TARGETS OR COMMISSIONS

Participants shared their perspective on current emission target reduction targets:

- While many communities are interested in climate and environment objectives, few are making changes, and most remain focused on growth, affordability and economic development.
- There are no strong commitment to specific emission reduction targets or commissions.
- Some municipalities have adopted climate adaptation plans, but these are not considered priority projects.
- There is a lack of appetite for mitigation efforts, possibly due to a lack of education and competing priorities.
- Some actions that could reduce greenhouse gas emissions are not being done due to funding issues, anxiety, and other competing priorities.

URBAN SYSTEMS

POLICY CHANGES AND FUNDING COULD HELP TO SPEED UP ENERGY PLANNING

Participants shared factors that they felt could speed up changes in electricity and natural gas need to include:

- **Prioritization:** The province could identify and prioritize different types of services, such as new housing versus crypto, instead of the current first-come, first-serve process.
- **Funding:** Funding availability and political support are crucial. Alignment between federal and provincial governments could help to expedite planning. Finding ways to make projects more sellable and taking advantage of funding to cover costs are important. Lower interest loans for developers can help them take advantage of alternative options.
- **Mandates and policies:** Manitoba Hydro and Efficiency Manitoba have mandates to provide affordable energy, but this does not necessarily reflect all environmental goals. This is made more challenging when policy direction changes when governments change.
- **Capacity and resources:** Municipalities may lack the capacity to pursue opportunities and need consultants and staff resources.

URBAN SYSTEMS

MUNICIPALITIES ARE AWARE OF NET-ZERO FUTURES BUT DO NOT HAVE CONCRETE PLANS IN PLACE

Participants shared their perspective on current net-zero planning:

- Some communities have climate action plans, but there isn't much consideration for net-zero futures in day-to-day planning and operations and it is not a top priority in their strategic plans.
- Some municipalities are working towards improving efficiencies and decreasing usage in municipal operations but are not in a position to make those transitions alone.
- Council does not hold the decision-making power for all net-zero initiatives and there is a reliance on Hydro to make investments and create a net-zero economy.
- Political will and capacity are needed to make transitions towards net-zero futures.

URBAN SYSTEMS

MUNICIPALITIES ARE RESPONDING TO NET-ZERO POLICY BUT ARE CONCERNED ABOUT THEIR ABILITY TO SUPPORT A FULL TRANSITION TO A NET-ZERO ECONOMY BY 2050

- **Building code:** Manitoba is looking to adopt a new building code to prepare net zero goals, but there is uncertainty about municipalities role and preparedness to reach these net zero building targets.
- **Transportation:** Most people have internal combustion engine vehicles and many commute to work and/or outside of the community, which poses a challenge. Some communities are piloting transportation programs aimed at reducing emissions.
- **Natural assets:** Tree planting program grants are being provided to reduce the heat island effect. Some communities have plans to provide GHG credits for tree development, although this is not in place right now.
- **Leadership and direction:** More leadership and direction from the province and Manitoba Hydro are needed to make net zero a reality.
- **Affordable Energy Plan:** There is uncertainty about how / whether this plan has supported policy change.

URBAN SYSTEMS

MUNICIPAL PLANS ARE STARTING TO FOCUS ON SUSTAINABILITY AND EFFICIENCY

- **Planning and zoning by-laws** are being reviewed and updated to support density and energy technologies, including:
  - Wind and solar energy sources
  - Smaller minimum dwelling sizes and building footprints
  - Reduced parking requirements
  - Secondary suites and duplexes
  - Infill energy technologies, including:
  - development guidelines
- **Transportation plans** are being developed to expand transportation modes, shift modes, and reduce vehicle dependency. Transportation facility designs are starting to incorporate bike lanes and green infrastructure (such as bioswales and native plantings).
- **Building by-law updates** are being worked on to address efficiency and match the updated building code.
- **Asset management plans** are including green infrastructure, natural assets and energy efficient building / equipment considerations.

URBAN SYSTEMS

THERE IS A RANGE OF PERSPECTIVES ON THE FUTURE ROLE OF NATURAL GAS, WITH CONSIDERATIONS FOR AFFORDABILITY, FEASIBILITY, AND ALTERNATIVE ENERGY SOURCES

- Some communities want greater access to natural gas, while others are considering moving away from it.
- Natural gas is still seen as the best option for many uses. Some councils are committed to requiring natural gas in new residential development for affordability. Some communities are still quite dependent on natural gas due to its affordability.
- Some communities are not as supportive of natural gas, but there is reluctance to fully transition away due to demand from.
- There might be increased interest in switching to other energy sources if prices increase.
- There is a desire for a transition to a hybrid combination of resources, including wind, solar, batteries and geothermal. Geothermal energy is considered but may not be feasible due to bedrock and soil conditions.

URBAN SYSTEMS

SOME COMMUNITIES HAVE EXPLORED ALTERNATIVE FUELS THROUGH FEASIBILITY STUDIES AND CONVERSATIONS WITH INDUSTRIAL DEVELOPERS

Participants indicated that exploration of alternative fuels has included:

- Clean biomass studies through Manitoba Sustainable Energy
- Interest from companies looking at biomass facilities
- Wastewater Treatment Plant biogas
- Rapid organic convertor studies

URBAN SYSTEMS

MUNICIPALITIES ARE CONCERNED ABOUT LIMITATIONS TO GROWTH AND EXPANSION THAT COULD IMPACT ECONOMIC DEVELOPMENT

- **Capacity barriers:** There are barriers to getting the necessary capacity to support growth and development.
- **Industry growth:** There is a need to proactively address industry growth to avoid losing developers or industries.
- **Emergency management operations:** There are concerns that reliability could compromise emergency management operations.
- **Engagement with Manitoba Hydro:** There is a desire for Manitoba Hydro to engage with municipalities sooner and in different ways so that Manitoba Hydro can proactively understand municipalities' future plans.

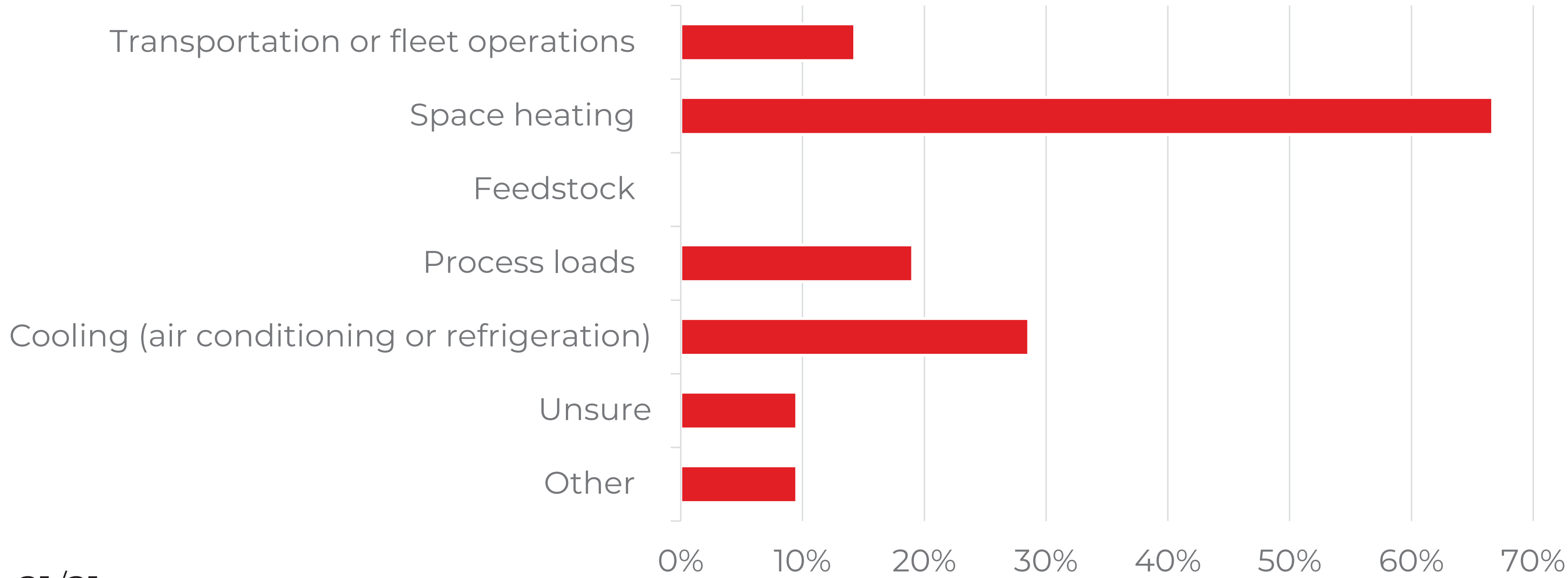
MUNICIPALITIES HAVE A DESIRE TO BUILD A STRONG RELATIONSHIP WITH MANITOBA HYDRO AND CONTINUE TO PROACTIVELY COLLABORATE

- **Access to local energy and operations data:** Remains a challenge for ongoing energy planning and reporting, with municipalities mentioning they face difficulties in retrieving their energy use data. Building greater awareness in tools like ENERGY STAR Portfolio Manager could help.
- **Relationship with Hydro:** There is room for improvement in the collaboration between Hydro and municipalities, especially as it can be challenging to know who to reach out to for questions and support. Assigning specific Hydro staff to municipalities could help.
- **Partnership with municipalities:** Municipalities should be leaned on as partners for renewable and other energy sources.

URBAN SYSTEMS

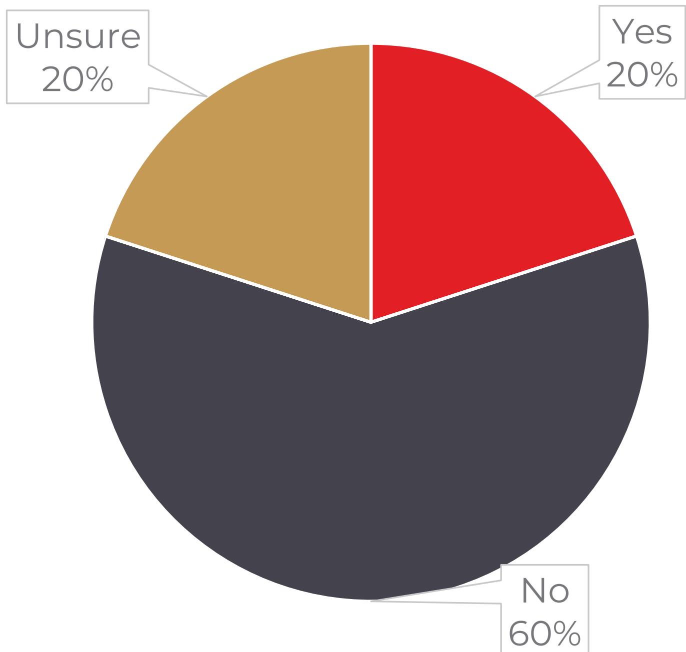
SURVEY FINDINGS

WHAT IS YOUR MUNICIPALITY'S LARGEST SOURCES OF ELECTRICITY AND NATURAL GAS CONSUMPTION IN YOUR OPERATIONS?



N=21/21

MANITOBA HYDRO IS EXPLORING FUTURE ENERGY SCENARIOS, INCLUDING THE POSSIBILITY OF A NET-ZERO FUTURE BY 2050. HAS YOUR MUNICIPALITY CONSIDERED SIMILAR GOALS?



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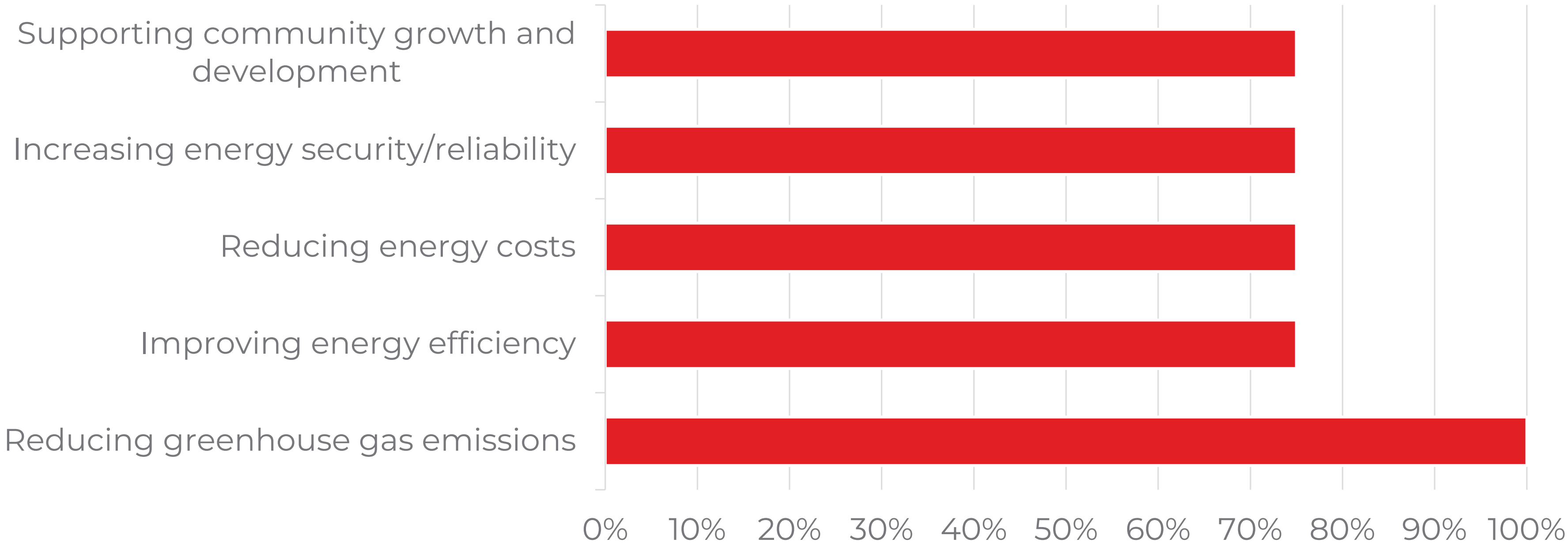
WHAT ARE THE KEY GOALS FOR YOUR ENERGY PLANS?



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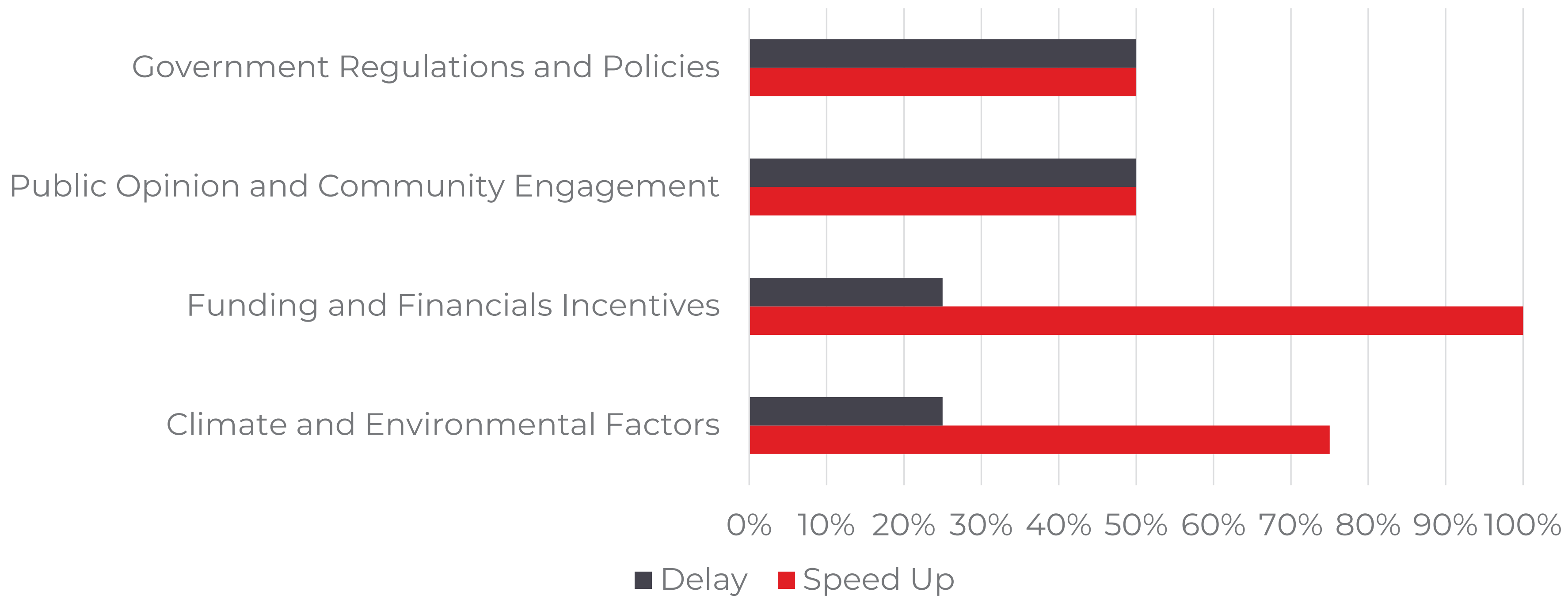
URBAN SYSTEMS

ARE THERE ANY FACTORS THAT COULD SPEED UP OR DELAY YOUR FUTURE ENERGY PLANS?



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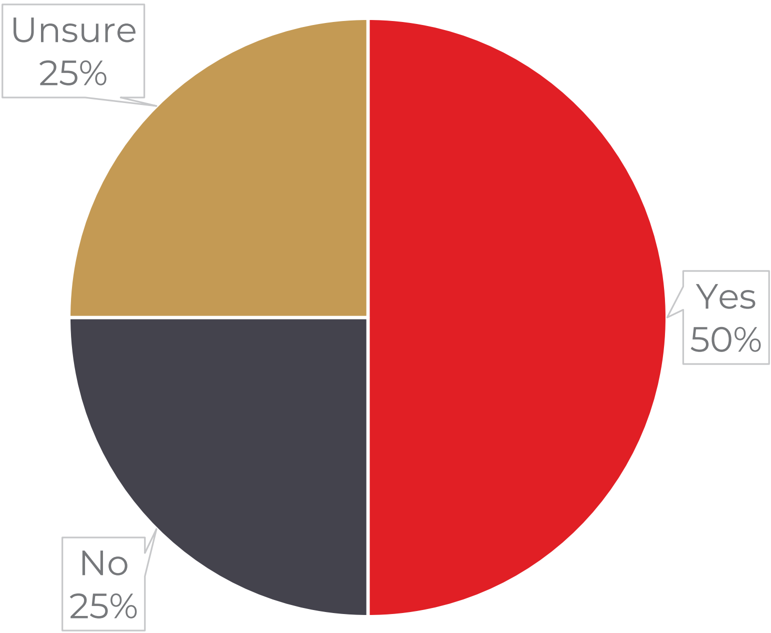
THINKING ABOUT YOUR MUNICIPALITY'S CURRENT ENERGY USE, DO YOU ANTICIPATE ANY SIGNIFICANT CHANGES IN YOUR COMMUNITY'S FUTURE ENERGY NEEDS?



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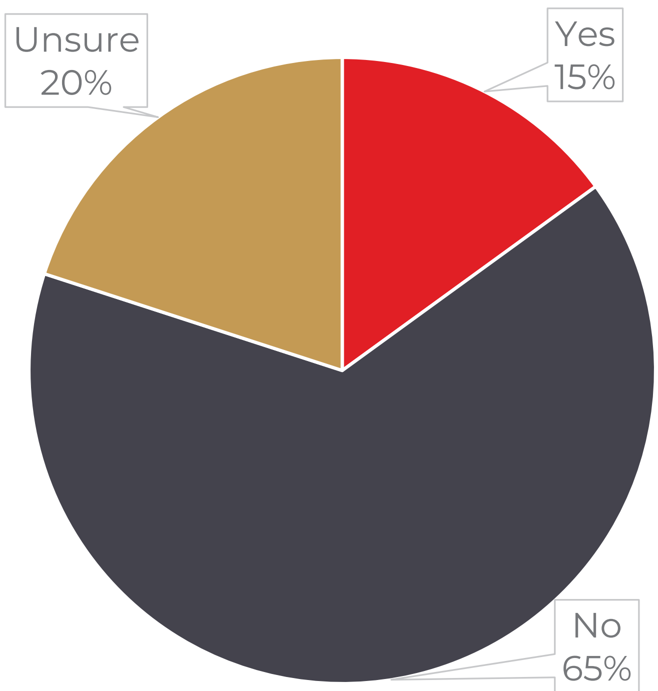
DOES YOUR MUNICIPALITY HAVE ANY EMISSIONS REDUCTION TARGETS OR COMMITMENTS?



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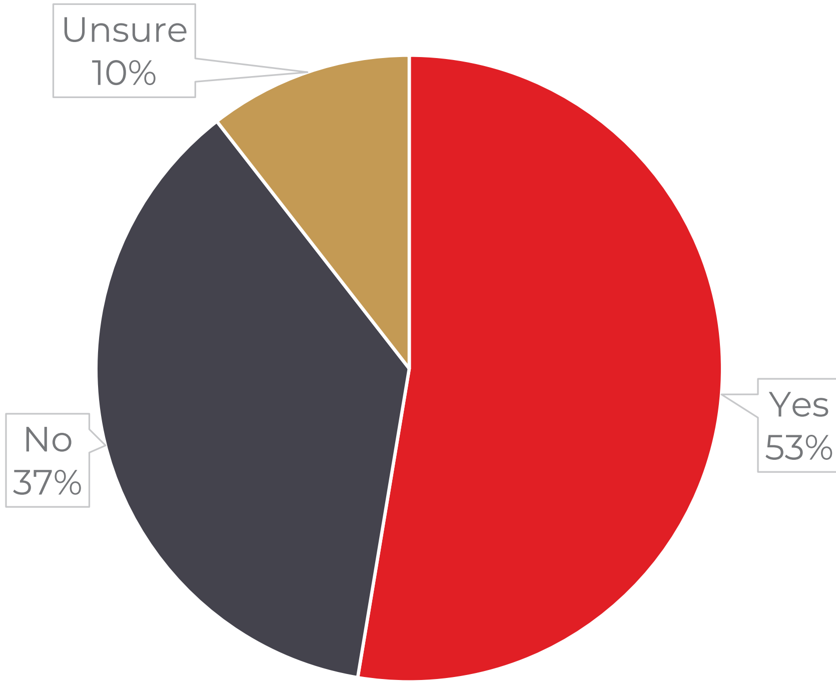
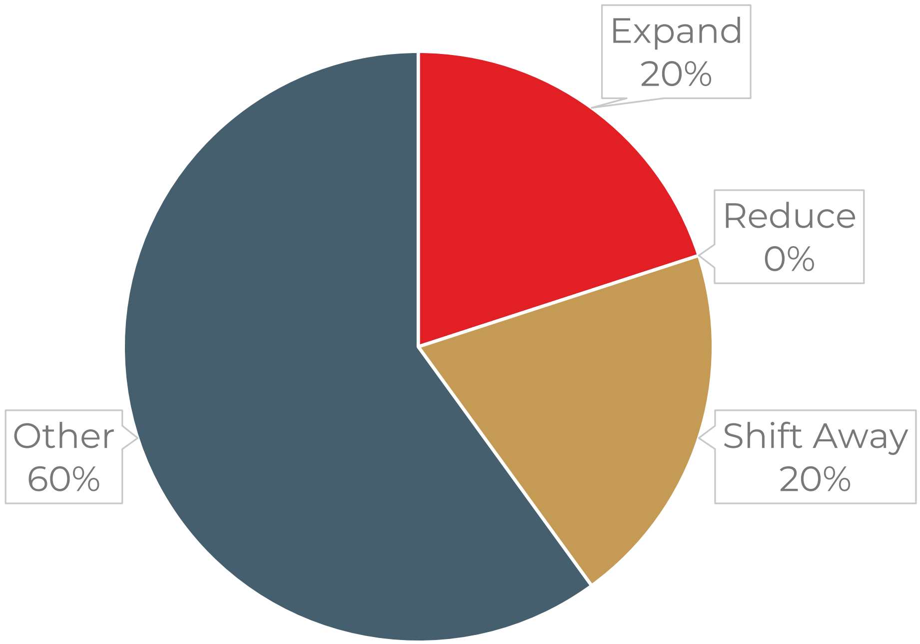
HAS YOUR MUNICIPALITY CONSIDERED THE FUTURE ROLE OF NATURAL GAS IN MEETING YOUR COMMUNITY'S ENERGY NEEDS?



N=19/21

IS YOUR MUNICIPALITY PLANNING TO EXPAND, REDUCE, OR SHIFT AWAY FROM NATURAL GAS?

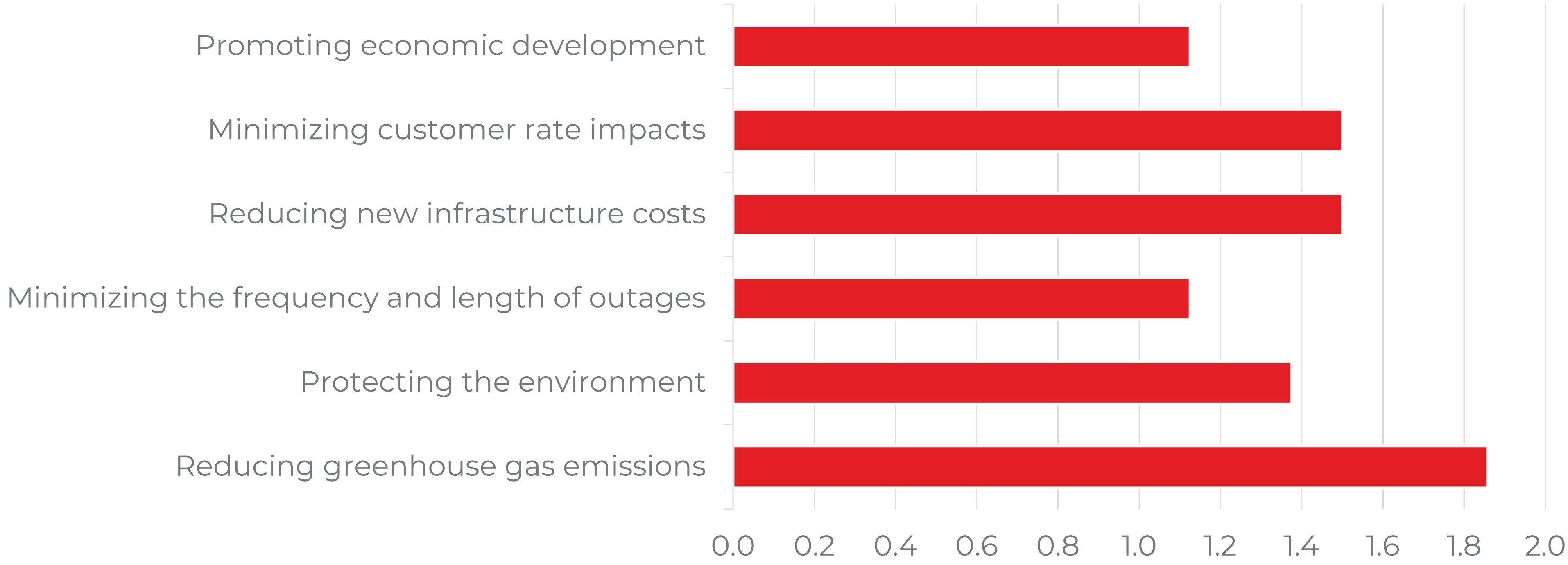
- "Other" included: Maintain, no plans, and leaving the decision to developers
- 4 respondents did not have natural gas in their municipality



N=5/21

URBAN SYSTEMS

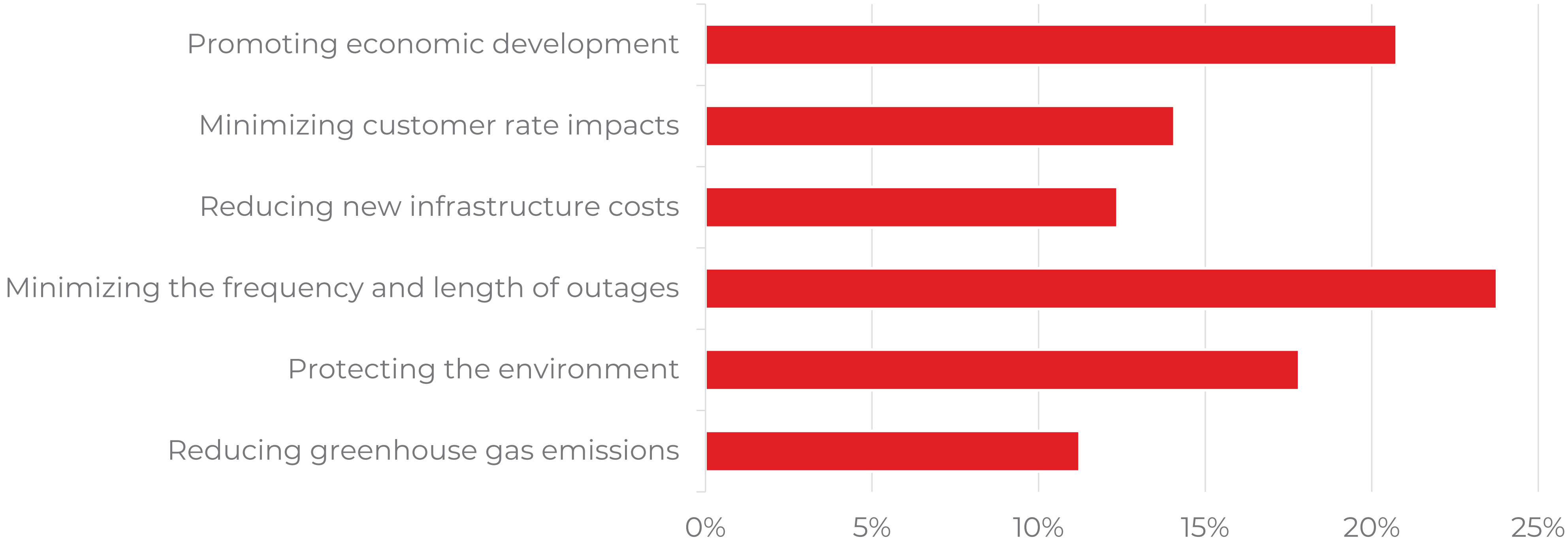
WHEN YOU THINK ABOUT YOUR COMMUNITY, HOW IMPORTANT DO YOU THINK EACH OF THE FACTORS IS FOR MANITOBA HYDRO TO CONSIDER?



N=8/8

URBAN SYSTEMS

ALLOCATE 100 POINTS AMONG THE FACTORS BASED ON HOW IMPORTANT YOU THINK THEY ARE IN RELATION TO EACH OTHER.



N=6/8

WHAT OTHER FACTORS DOES YOUR MUNICIPALITY THINK SHOULD BE CONSIDERED AS WE MAKE FUTURE ENERGY DECISIONS?

- “Lower costs for us to expand natural gas”
- “I see a trend towards the production of corn in our area and if we had the ability to access natural gas to operate our grain driers that would be a game changer for local growers in that we would be able to diversify our operations.”
- “Rural areas have less carbon emissions than urban areas but are expected to deliver net-zero results. Rural areas have different needs than the urban areas and do not have the infrastructure that urban areas have”
- “Economic development strategies of Hydro and producer town”
- “Keeping traditional lands in mind and hearing local voices is important; Fair compensation to municipalities when transmission lines or other lands are rendered unusable for future development or Hydro development results in the reduction in assessed values as these have true financial impacts to the municipal taxpayers.”
- “Minimize increases to customers.”

N=6/8

URBAN SYSTEMS

TELL US MORE ABOUT HOW YOU CHOSE YOUR PRIORITIES. WHAT WERE YOU CONSIDERING AS YOU DECIDED HOW TO ALLOCATE YOUR POINTS?

- “The length of outages. People's reliance on Hydro for everything from heating their homes, keeping the contents of their fridges and freezers from spoilage and the power for communication devices”
- “Economic developing new and lost opportunities with Hydro's help”
- “Protecting environment: if we don't then there will be greater long-term impacts for all living things; same goes for reducing greenhouse gas emissions”
- “Minimize outage lengths is important for life safety, and Hydro already does a decent job of this - thank you! Also costs to ratepayers, because times are hard for some, and they shouldn't have to chose between paying for Hydro or food”
- “Infrastructure costs - there is only so much that can be controlled, but this should be reduced where possible”
- “Economic development - I am not sure what this means for Hydro/Gas as this term means a lot of different things to different people.”

N=3/8

URBAN SYSTEMS

DO YOU HAVE ANY ADDITIONAL COMMENTS OR FEEDBACK REGARDING YOUR MUNICIPALITY'S ENERGY TRANSITION, ENERGY PLANS, OR ANY OTHER TOPICS WE MAY NOT HAVE COVERED?

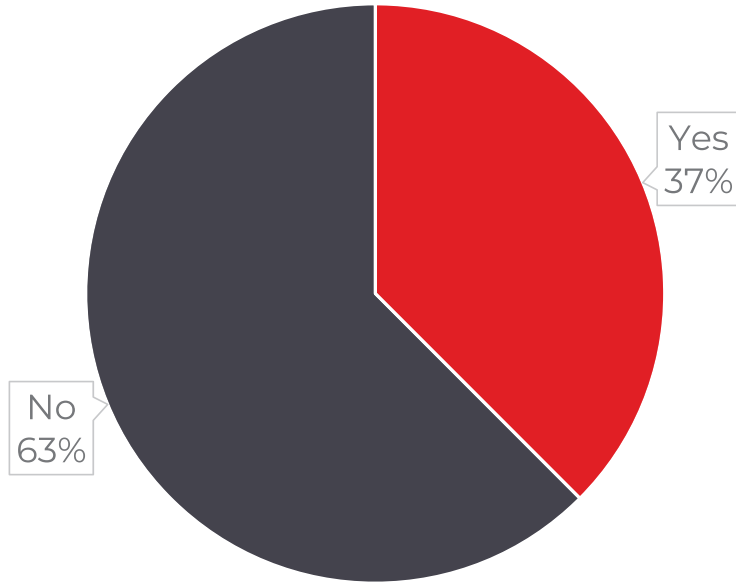
- "Economic development, Hydro dam town, looking forward to economic development with help of Hydro"
- "We do make an attempt to be more 'green', however to say that we are actively working towards carbon neutrality by a given date would be misleading. There are many challenges for a small tax-based local government that come into play. Financial incentives, like the solar rebate program, help tremendously in moving in the more energy efficient/carbon neutral direction."
- "Would like solar and wind power development in our municipality."

N=3/8

- "We would be interested in solar powered municipal buildings if more funding were available."
- "Would love to see natural gas expansion in our municipality"
- Even though we have a lot of industry in our area I feel that the addition of natural gas as a power source would help a lot towards the expansion of industry and therefore jobs and population growth to our municipality.
- Natural gas is only available to the one agri-business that paid to service their own property. It will be used by others as well, when it become available.
- Natural Gas is not available in the rural area.
- We would like to be considered for natural gas in the future

URBAN SYSTEMS

WOULD YOU LIKE TO LEARN MORE ABOUT ENERGY PLANNING IN MANITOBA AND PARTICIPATE IN FUTURE ENGAGEMENT OPPORTUNITIES?



N=8/21

PARTICIPATION

INTERVIEW PARTICIPANTS

WHICH MUNICIPALITY, COMMUNITY, TOWN OR CITY DO YOU REPRESENT?

- City of Brandon
- Town of Niverville
- City of Portage la Prairie
- RM of Rosser
- Town of Stonewall
- City of Winkler

WHICH OF THE FOLLOWING BEST DESCRIBES YOUR ROLE?

- Chief Administrative Officer
- Environmental Initiatives Coordinator
- Engineering Consultant
- Director of Operations
- Planning & Permitting Manager
- Engineering Services Manager

URBAN SYSTEMS

SURVEY PARTICIPANTS

WHICH MUNICIPALITY, COMMUNITY, TOWN OR CITY DO YOU REPRESENT?

- Town of Carberry
- Cartwright-Roblin Municipality (3)
- Municipality of Glenboro South Cypress
- RM of Grahamdale
- Municipality of Killarney-Turtle Mountain
- RM of Macdonald
- Municipality of McCreary
- RM of Morris
- Municipality of Norfolk Treherne
- RM of Pipestone
- Town of Powerview Pine-Falls
- RM of Ste. Anne
- Town Ste. Anne
- RM of St. Laurent
- RM of Yellowhead
- RM of Whitemouth
- City of Winnipeg (2)
- RM of Woodlands

WHICH OF THE FOLLOWING BEST DESCRIBES YOUR ROLE?

- Mayor / Head of Council / Reeve (3)
- Councillor
- Deputy Mayor
- Chief Administrative Officer (13)
- Administrative Assistant
- Green Buildings Specialist
- Manager, Sustainability

URBAN SYSTEMS

6. Technical Advisory Committee (TAC)

To ensure a broad range of input into our 2025 IRP, the Technical Advisory Committee (TAC) was established as a new engagement mechanism to gather feedback from a variety of participants with a demonstrated interest in long-term energy planning in Manitoba, from key areas of interest.

The following information is provided in the subsequent sub-sections:

- 6.1. Engagement Process Summary
- 6.2. Terms of Reference
- 6.3. Membership List
- 6.4. Presentations and Handouts
- 6.5. Meeting Summaries

6.1. TAC Engagement Process Summary

The Technical Advisory Committee (TAC) was newly established for the 2025 IRP to gather diverse perspectives from various Manitoba groups actively interested in long-term energy planning. The TAC's role was to provide feedback on IRP development aspects such as key inputs, scenarios, evaluation metrics, and resource options used in the analysis to arrive at a recommended and alternative development plan.

TAC membership includes knowledgeable participants who have significant interest or experience with Manitoba Hydro's Integrated Resource Planning process. Membership outreach considered the following criteria:

- Can bring a representative perspective to the discussion.
- Have a broad focus and interest (based on the organization's mandate or research) on long-term energy planning, or knowledge of key factors that could influence energy use in Manitoba.
- Have an understanding of how Manitoba Hydro's long-term energy planning aids and/or impacts their organization's mandate and objectives.
- Have a demonstrated interest in Manitoba Hydro's long-term energy planning through involvement in previous Manitoba Hydro IRPs by and/or Public Utilities Board processes.

Members were sought and invited from key areas of interest:

- Government entities (i.e., municipal, Indigenous organizations, crown corporations)
- Various demographics and customer interest groups (i.e., representation from industrial, commercial, residential customers)
- Geographic regions within Manitoba
- Associations
- Economic development groups
- Academia/Research
- Areas of interest (i.e., electric vehicles, heat pumps, solar, biomass, electric vehicles, social & environmental NGOs)

Seven TAC meetings were held between October 2024 and December 2025. Each meeting focused on different topics of the IRP development process and included presentations, discussions, and break-out activities. Members were invited to the sessions directly by email. Each session lasted 2-3 hours. The session began with a land acknowledgement, and was followed by a brief introduction, the agenda for the session, and some housekeeping. Discussions and feedback were documented by note-takers.

When possible, pre-reading and supplemental materials were provided in advance. A copy of the presentation was provided at each session and shared via email following the session. TAC members could also communicate through the general IRP email address.

Summaries from each session were prepared and published to the IRP website. Members had an opportunity to review the summaries and provide feedback.

Meeting #1 - November 8, 2024

Held in person at Manitoba Hydro Place

This meeting was facilitated by a representative from Manitoba Hydro with presentations from IRP team members. It focused on welcoming the TAC members, discussing the TAC Terms of Reference, and an introduction to the 2025 Integrated Resource Plan.

Meeting # 2 - November 21, 2024

Held in person at Manitoba Hydro Place

This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members. It focused on reviewing feedback provided by the TAC on the TAC Terms of Reference, load projections, greenhouse gas emissions and the resource options inventory. Workshop activities provided an opportunity for participants to discuss the load projection assumptions in detail. Due to timing constraints, the resource options inventory section of the meeting was recorded after the meeting and sent to members to view.

A post-session survey was sent to members via email to collect feedback on the session and to provide an additional opportunity for members to send further workshop activity comments.

Meeting #3 – December 2, 2024

Held in person at Manitoba Hydro Place

This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members. It focused on modelling, analysis, and evaluation. Workshop activities provided an opportunity for participants to discuss the evaluation themes and criteria in detail.

A post-session survey was sent to members via email to collect feedback on the session, to indicate future topics they would like to know more about, and to provide an additional opportunity for members to send further workshop activity comments.

Meeting #4 – January 31, 2025

Held on MS Teams

Based on feedback from Meeting #3, a supplemental session was added to share key concepts of energy planning. This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members.

Meeting #5

The meeting was cancelled in response to a communications blackout associated with a Provincial by-election. Content of future meetings was adjusted to account for this cancellation.

Meeting #6 - April 7, 2025

Held in person at Manitoba Hydro Place

This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members. It focused on a summary of feedback from Round 1 engagement, and detailed observations from preliminary modelling and analysis results.

Meeting #7 - July 17, 2025

Held MS Teams

Mid-Project Information Session

This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members. It focused on key observations from the development process including: 1) Six feasible resource options available that can be developed in the next ten years to meet demand (the development plan timeframe), and 2) The range of load projections studied in this IRP is broad, and we need to identify a narrower range to focus on when creating a development plan.

Meeting #8 - December 9, 2025

Held in person at the Delta Hotel, 350 St Mary Ave, Winnipeg, MB.

This meeting was facilitated by Urban Systems Ltd. with presentations from IRP team members. It focused on sharing the 2025 IRP road map. Break out discussions provided an opportunity for participants to discuss and provide feedback on the recommended development plan and near-term actions in detail.

6.2. TAC Terms of Reference

Drafted by Manitoba Hydro and adapted based on TAC member feedback, the Terms of Reference established the committee purpose, membership criteria, responsibilities of members as well as Manitoba Hydro, and the anticipated meeting schedule for the group.

2025 INTEGRATED RESOURCE PLAN TECHNICAL ADVISORY COMMITTEE TERMS OF REFERENCE

Introduction

Manitoba Hydro is committed to engaging with customers, interested parties, and the broader energy planning community in the development of the 2025 Integrated Resource Plan (IRP). The creation of the 2025 IRP Technical Advisory Committee (herein referred to as the TAC) will bring diverse perspectives together from a variety of representative groups across Manitoba with a demonstrated interest in long-term energy planning.

Purpose

The 2025 IRP will be informed by the TAC and other engagement. The TAC is established to gather diverse perspectives from various Manitoba groups actively interested in long-term energy planning. The TAC's role is to provide feedback on IRP development aspects such as key inputs, scenarios, and evaluation metrics. Engagement with the TAC is one part of province-wide engagement to seek feedback more broadly with the public, customers and interested parties in Manitoba. Participation in the TAC is an engagement effort and is not considered consultation.

The TAC is intended to provide feedback from representative organizations across Manitoba, with members sharing their knowledge and expertise from the perspective of their role(s) within their organization. The TAC will not be required to reach consensus and will not be responsible or accountable for decisions or determining a recommended development plan within the 2025 IRP.

Membership Criteria

TAC membership includes knowledgeable participants that have significant interest or experience with Manitoba Hydro's Integrated Resource Planning process. Membership is chosen considering the following criteria:

- Can bring a representative perspective to the discussion.
- Have a broad focus and interest (based on the organization's mandate or research) on long-term energy planning, or knowledge of key factors that could influence energy use in Manitoba.
- Have an understanding of how Manitoba Hydro's long-term energy planning aids and/or impacts their organization's mandate and objectives.
- Have a demonstrated interest in Manitoba Hydro's long-term energy planning through involvement in previous Manitoba Hydro IRPs by and/or Public Utilities Board processes.

Members are sought from key areas of interest:

- Government entities (i.e., municipal, Indigenous organizations, crown corporations)
- Various demographics and customer interest groups (i.e., representation from industrial, commercial, residential customers)
- Geographic regions within Manitoba
- Associations
- Economic development groups
- Academia/Research
- Areas of interest (i.e., electric vehicles, heat pumps, solar, biomass, electric vehicles, social & environmental NGOs)

Responsibilities of the Members

- Manitoba Hydro will Chair the TAC; the role will normally be fulfilled by the Manager, Integrated Resource Planning Policy & Coordination.
- Strive to attend all scheduled meetings to ensure consistent participation and build the TAC as a team. If unable to attend, members may provide an alternate attendee and share previous TAC materials with the alternate.
- Try to review material provided in advance of a meeting (if provided by Manitoba Hydro).
- Support a welcoming and inclusive environment. Actively and respectfully participate in discussions. Not all members may participate in every discussion.
- Conduct themselves honestly, fairly, ethically and with integrity and be respectful of one another, Manitoba Hydro staff and facilitators.
- Report potential conflicts of interest to the TAC Chair with a proposal for how to manage the potential conflict.
- Focus discussions on topics related to the development of the 2025 IRP.
- TAC participation does not restrict members from seeking intervenor or presenter status in future Public Utilities Board hearings or other regulatory processes.
- TAC members are invited to provide feedback during meetings. If TAC members would like feedback specifically noted in meeting notes, please advise Manitoba Hydro either during the meeting or by email at IRP@hydro.mb.ca. Additional feedback, outside of the meetings, can be provided by email.
- Compensation will not be offered to members, however if expenses are a barrier to participation, please contact the Chair to discuss potential solutions.
- Consultants of the Public Utilities Board are participating as observers. While they may provide guidance on the scope of matters to be included in the IRP, they will not provide substantive advice or recommendations on how Manitoba Hydro should meet its resource needs.

Responsibilities of Manitoba Hydro

- A representative from Manitoba Hydro will act as Chair for the TAC. The Chair is responsible for:
    - committee coordination including member recruitment,
    - scheduling and planning for meetings,
    - acquiring support resources,
    - conducting meetings in accordance to the Terms of Reference, and
    - preparing meeting notes.
- Retain external facilitator to moderate meetings.
- Ensure Subject Matter Experts from within Manitoba Hydro are available to support discussions as needed.
- Support a welcoming and inclusive environment. Actively and respectfully participate in discussions. Respect that not all members may participate in every discussion.
- Conduct themselves honestly, fairly, ethically and with integrity and be respectful of TAC members, other Manitoba Hydro staff and group facilitators.
- Review and disclose potential conflicts of interest with the TAC along with how the potential or conflict will be managed.
- Review TAC feedback and share what was heard, what Manitoba Hydro did (with the feedback) and the rationale. For example, feedback may be considered in the IRP or in other Manitoba Hydro work.
- Post all TAC materials such as agendas, presentations, and meeting notes to the Manitoba Hydro public website.
    - Meeting notes will be prepared and shared to provide a summary of the TAC discussions without attributing feedback to a specific individual or group. These notes will not be minutes.
    - All TAC materials will be documented as part of a report on engagement for the 2025 IRP.
- Information of a sensitive or confidential nature, or that are not directly related to the development of the 2025 IRP, will not be shared with TAC membership.

Meetings Schedule

Agendas will be set by Manitoba Hydro. Meetings will commence in November 2024 and be held at key points in the development process (approximately 6-7 meetings) until June 2025. Meetings will be up to 4 hours in length and scheduled during the work week (Monday to Friday). They will be held in person, usually at Manitoba Hydro Place, 360 Portage Avenue, Winnipeg, Manitoba.

A tentative schedule and agendas are as follows:

Meeting 1: November 8, 2024.

- Committee Introductions.
- Review of Terms of Reference.
- Overview of Manitoba Hydro's 2025 IRP and its objectives, including approach to engagement.
- Introduction to proposed key inputs, scenarios, and evaluation metrics.

Meeting 2: November 21, 2024.

- Overview of key inputs and scenarios and how they are used in modelling and analysis.
- Approach to developing load projections.
- Feedback to be sought from the group to inform the load projections.
- Introduction to resource options strategies and how they are used with load projections to establish future scenarios.

Meeting 3: December 2, 2024.

- Modelling plan including scenarios and sensitivity analysis.
- Evaluation methodology, including initial evaluation metrics.
- Feedback to be sought from the group to inform evaluation metrics.

Meeting 4: Late March.

- Initial modelling results.

Meeting 5: April/May.

- Draft 2025 IRP road map and recommended development plan.
- How evaluation metrics were applied and discuss each approach and the pros and cons.

Meeting 6: June.

- Share final draft recommended development plan and 2025 IRP road map.

6.3. TAC Membership List

Manitoba Hydro
2025 Integrated Resource Plan

Technical Advisory Committee
Membership List

Member [Alternate]	Organization
Patricia Fitzpatrick	Academic (University of Winnipeg)
Duane Nicol	Association of Manitoba Municipalities / Manitoba Municipal Administrators
Becky Raddatz	City of Winnipeg
Curt Hull	Climate Change Connection
Peggy Barker	Consumers Coalition
Jeff Bower	Daymark Energy Advisors
Dany Robidoux [Shane Pelletier]	Eco-West/Éco-Ouest Canada
Colleen Kuruluk [Michael Stocki]	Efficiency Manitoba
Christa Rust [Sarah Duval]	Manitoba Chamber of Commerce – Manitoba Green Advantage
Teody Leano	Manitoba Government - Climate Change & Energy Branch
David Scammell	Manitoba Government - Finance
Dale Friesen	Manitoba Industrial Power Users Group – Intergroup Consultants
Anita Murdock	Manitoba Keewatinowi Okimakanak Inc.
Christian Goulet [Reed Forrest]	Manitoba Métis Federation – National Government of the Red River Métis
Wayne Clayton	Manitoba Sustainable Energy Association
Brady Ryall	Public Utilities Board
Laura Tyler	Sustainable Building Manitoba
Jose (Jojo) Delos Reyes	Red River College Polytech
Cameron Whitton	University of Manitoba

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
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6.4. TAC Presentations

This section includes the following materials:

- Presentation: Technical Advisory Committee Meeting #1
- Presentation: Technical Advisory Committee Meeting #2
- Presentation: Technical Advisory Committee Meeting #3
- Presentation: Technical Advisory Committee Meeting #4
- Presentation: Technical Advisory Committee Meeting #6
- Presentation: Technical Advisory Committee Meeting #7
- Presentation: Technical Advisory Committee Meeting #8

2025 Integrated Resource Plan

Technical Advisory Committee

Fall 2024 – Meeting 1

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

Land acknowledgment

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 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.

Agenda

Purpose:
Welcome TAC members!
Hear what is important to you as we plan for Manitoba's energy future.

Topics

1. Committee Introductions
2. Introduction to 2025 IRP
3. Engagement Approach
4. Review of Terms of Reference
5. Signpost Update
6. Share key inputs and scenarios, and evaluation metrics
7. Next Steps

Committee Introductions

Committee Introductions - Roundtable

Introduce yourself and tell us which organization you represent.

Please share what you hope to achieve or learn from these Technical Advisory Committee meetings.

Introduction to the 2025 IRP

What is an Integrated Resource Plan?

- A utility best practice used across North America to understand and prepare for future energy needs.
- A repeatable process that plans for long-term needs and will be updated as future conditions evolve.
- One output of the ongoing planning cycle at Manitoba Hydro.
- Includes engagement to incorporate feedback from customers and interested parties.

The 2023 Integrated Resource Plan

- Primary objective was to plan for safe, reliable energy that meets the evolving needs of Manitobans at the lowest cost possible.
- Studied how the energy transition could impact our natural gas and electricity systems including generation, transmission and distribution.
- Resulted in a road map that included signposts and near-term actions
- Notable learnings from the 2023 IRP:
  - The energy transition is already underway in Manitoba
  - Investment is required in all scenarios
  - Natural gas will play a role in getting to a low carbon future

Why we need the 2025 IRP now

We need a development plan approved as soon as possible

- We need new resources as early as 2029/30.
- The Manitoba Hydro Act requires Manitoba Hydro to recommend a development plan for approval, prepared as part of an Integrated Resource Plan that is informed by engagement.

What is a development plan?

It outlines the steps Manitoba Hydro will take to meet future energy needs.

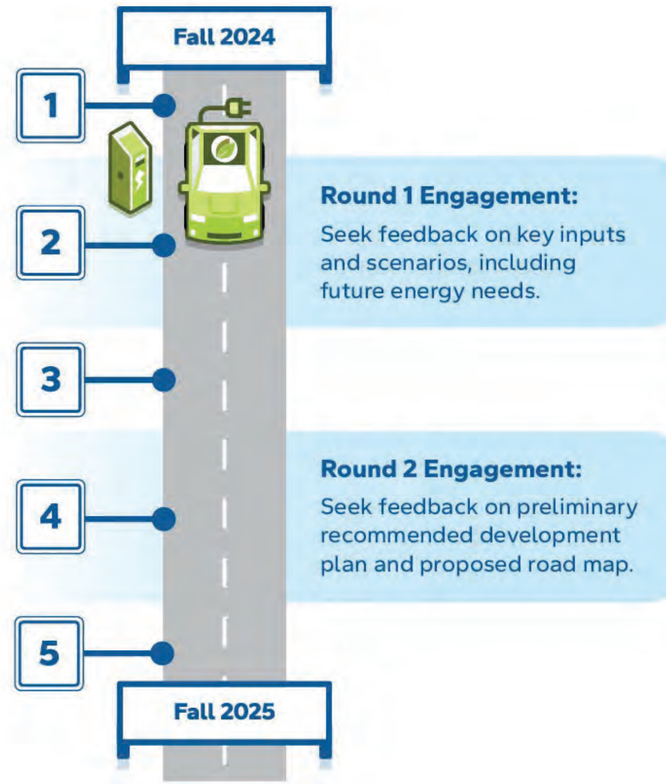
It may include building new energy sources, infrastructure, and programs to manage energy use during peak demand.

The 2025 Integrated Resource Plan will…

- Result in a road map that will include a recommended development plan of ~10 years.
- Include analysis that extends to 2050.
- Include all energy infrastructure, non-MH owned assets, and investments to defer need for new infrastructure.
- Consider policy from all levels of government, such as federal, provincial, and municipal.

2025 IRP process overview

1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan



2025 IRP – Engagement Approach

Why do we engage on our energy planning?

Provide openness and transparency to the energy planning process.

- Early and ongoing communications that support understanding and enhance energy knowledge.

Seek out and incorporate feedback from customers and interested parties into ongoing energy planning.

- Incorporate our customers future needs given uncertainty in timing and pace of change.
- Seek knowledge of key factors that may influence energy use and supply in Manitoba.

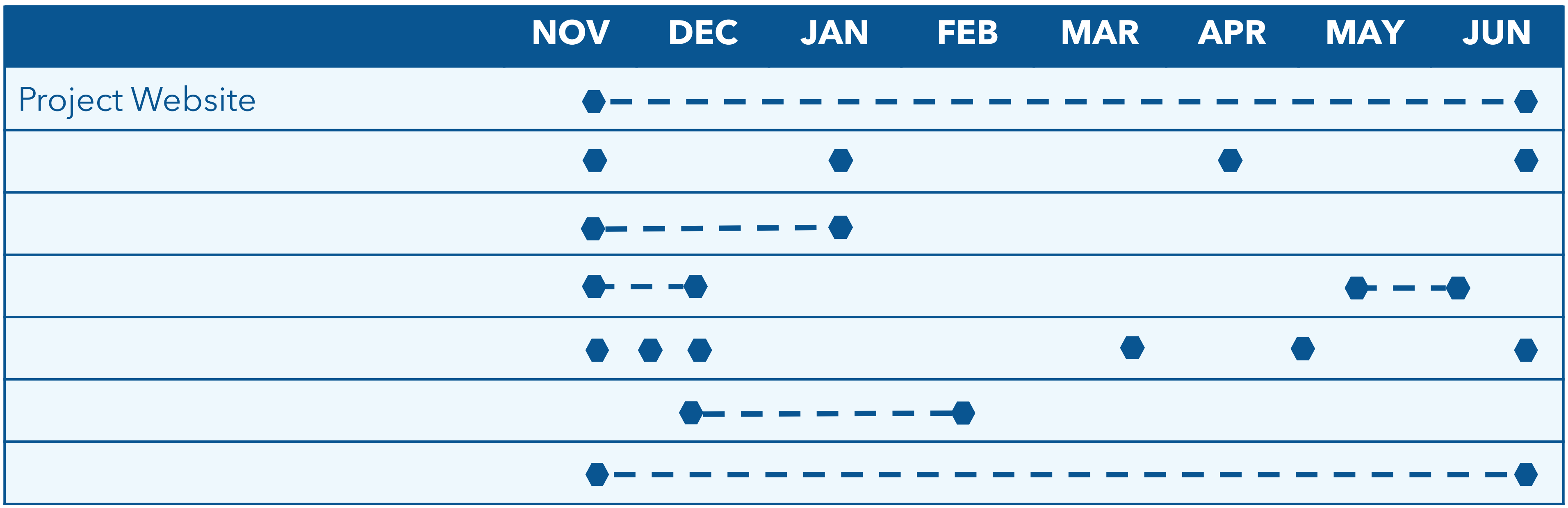
Bring diverse perspectives together to support consideration of broader impacts.

- Understand impacts of changing energy landscape across different sectors.
- Support consideration of broader social, climate, and economic priorities.

Who do we engage with?

MANITOBA ORGANIZATIONS RESPONSIBLE FOR ENERGY PLANNING	• Public Utilities Board • Government of Manitoba • Efficiency Manitoba
	• Representative groups with a demonstrated interest in long-term energy planning, brought together to share diverse perspectives on specific topics.
	• Academics • Associations • Economic Development Organizations • Indigenous Communities & Organizations • Municipalities • Non-Governmental Organizations – Social and Environmental • Large, Commercial, Industrial Customers
	• IRP Subscribers • General Public in MB

2025 IRP Engagement Opportunities



General Public Survey

Open November 5 – December 19!

- Available for all Manitobans to share their thoughts on their future energy use and what matters to them when it comes to their energy.
- Helps ensure our IRP reflects a variety of customer perspectives from across Manitoba.
- Targeted outreach efforts through direct emails, bill inserts, and social media.

Municipal Engagement

Goals

- Understand municipalities' potential long-term energy needs and plans (as energy users and a governing body).
- Understand potential changes in policy and decisions that may impact energy types and sources.

Outreach

- Interviews with municipalities and cities.
- Surveys distributed through regional conferences (Assembly of Manitoba Municipalities).
- Regional sessions in partnership with RMED + MH Economic Development Team.
- Regional in-person sessions (interest being determined).

First Nations & Métis Engagement

Goals

- Understand communities and customers evolving energy needs to inform the 2025 IRP and support meaningful and ongoing engagement on energy planning.

Outreach

- Leader-to-leader and bi-lateral conversations.
- Options that support community-led engagement.
- Technical Advisory Committee & Interested Party Workshops.
- Targeted surveys/interviews with interested leaders.
- Regional in-person sessions / meetings to be determined.

Large Customer Engagement

Goals

- Understand large customers' potential long-term energy needs and plans of top energy users.
- Understand if these customers anticipate major long-term changes in the source or quantity of energy.
- Understand motivation of these anticipated changes and factors that may impact the rate of change.

Outreach

- Interviews with top 15 natural gas users, large customers considering fuel switching, and large fleet owners.

Draft Terms of Reference

2025 IRP Technical Advisory Committee (TAC)

Draft Terms of Reference

Purpose

- Gather diverse perspectives from various Manitoba groups actively interested in long-term energy planning.
- Foster comprehensive dialogue on various components of the 2025 IRP.
- Provide feedback (from each members' perspective and the group they represent) on IRP development aspects such as key inputs, scenarios, and evaluation metrics.
- Feedback shared will be considered along with feedback heard through other 2025 IRP engagement.
  - Not require to reach consensus.
  - Not responsible for decisions within the 2025 IRP.

Draft Terms of Reference

Membership Criteria

Committee membership includes a cross-section of knowledgeable participants that have significant interest or experience with Manitoba Hydro's Integrated Resource Planning processes. Specifically, members were invited considering the following criteria:

- Can bring a representative or collective perspective to the discussion.
- Have a broad focus and interest (based on mandate or research) on long-term energy planning, or knowledge of key factors that could influence energy use in Manitoba.
- Having an understanding of Manitoba Hydro's long-term energy planning aids their organization's mandate and objectives.
- Have a demonstrated interest in Manitoba Hydro's long-term energy planning through involvement in previous Manitoba Hydro IRPs by and/or Public Utilities Board processes.

Draft Terms of Reference

Responsibilities of Members

- Attend all scheduled meetings.
- Review materials in advance to enable active participation.
- Focus discussions on issues and topics relevant to the 2025 IRP development.
- Actively engage in discussions, communicate respectfully, and foster an inclusive environment.
- Conduct yourself honestly, fairly, ethically and with integrity. Respect all members, Manitoba Hydro staff, and facilitators.
- Disclose any potential conflicts of interest.
- Bring the perspectives of the organization or sector represented and commit to share information back with them.
- Committee participation does not restrict members from seeking intervenor or presenter status in future Public Utilities Board hearings or other regulatory processes.

Draft Terms of Reference

Responsibilities of Manitoba Hydro

- Manage group coordination including recruitment, establishment of meeting schedule, and coordination of meetings and required resources.
- Retain an external facilitator to chair and moderate meetings.
- Ensure Subject Matter Experts from within Manitoba Hydro are available to support discussions as needed.
- Review feedback from TAC members and be accountable to share back how it was considered within the IRP where appropriate.
- Post all TAC meeting materials and presentations to the Manitoba Hydro public website.

Draft Terms of Reference

Committee feedback

- Members are asked to formally share any feedback or recommendations for Manitoba Hydro during scheduled meetings for documentation in the meeting notes.
- Manitoba Hydro will review this feedback in consideration of alignment to the 2025 IRP scope, schedule, and ability on what can be achieved.
- Proposed for Manitoba Hydro to respond to how feedback was addressed using the following coding system:
  1. Informational, no action needed
  2. Action required, expected in coming months
  3. Concern or suggestion, for future discussion or consideration
  4. Clarification needed

Draft Terms of Reference

Meeting Schedule

Meeting	Agenda & Topic Focus
Meeting #1: November 8, 2024 10:00 AM – 1:00 PM	• Committee introductions. • Review of 2025 IRP Terms of Reference. • Introduction to the 2025 IRP. • Share and seek feedback on the 2025 IRP proposed key inputs and scenarios. • Share and seek feedback on the 2025 IRP proposed evaluation metrics.
Meeting #2: November 21, 2024 11:00 AM – 2:00 PM	• Share approach to developing 2025 IRP proposed load projections and seek feedback to inform final 2025 IRP load projections. • Summary of resource options strategies and introduction of the resource options inventory.
Meeting #3 December 2, 2024 10:00 AM – 1:00 PM	• Overview of 2025 IRP proposed modelling plan including scenarios and sensitivity analysis. • Share evaluation methodology including initial evaluation metrics and seek feedback to inform the evaluation metrics.

All meetings scheduled for Manitoba Hydro Place (360 Portage Ave.), Winnipeg, MB

Draft Terms of Reference

Next Steps

- Reach out to absent members.
- Collect and review feedback on draft Terms of Reference.
- Revise Terms of Reference document based on feedback and discussions.
- Finalize Terms of Reference document and circulate to members.

Signpost Update

Reading the signs to help you navigate the energy transition.

Signpost Update

What are the signposts?

Indicators that inform on the timing, pace, magnitude, or type of changes happening in the energy landscape.

- **Government actions**
- **Customer decisions**
- **Electric Vehicles**
- **Technologies & Markets**

By monitoring signposts, trends can be identified to anticipate and understand when and how changes are occurring.

Signpost Update

Signposts explained

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

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

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

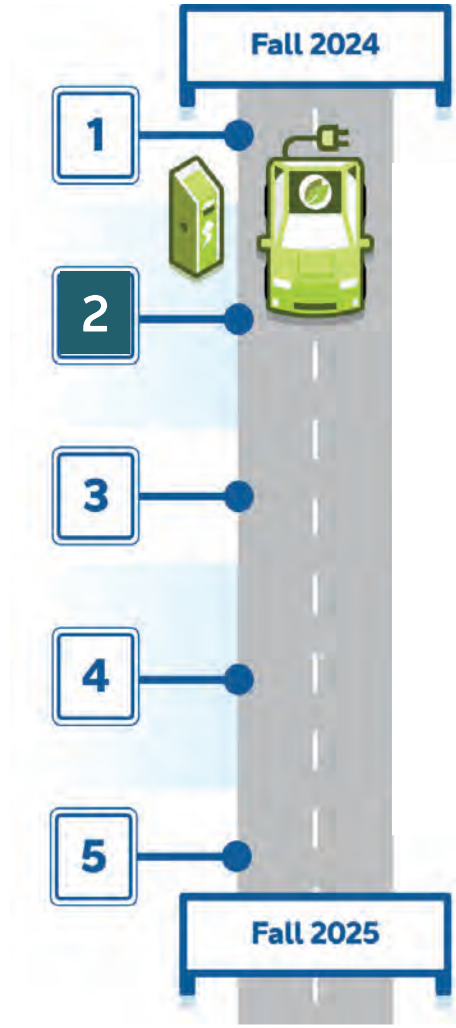
Technologies & markets: Keeping on top of technologies, including those used to produce, deliver, and store energy, and changes in energy markets.

Signpost Update

Do you want to know more about the Signpost Update?

https://www.hydro.mb.ca/docs/corporate/irp/2023-irp-signpost-update-en.pdf

Step 2. Develop Key Inputs and Scenarios



Step 2. Develop key inputs and scenarios

What is included in this step of the 2025 IRP development process

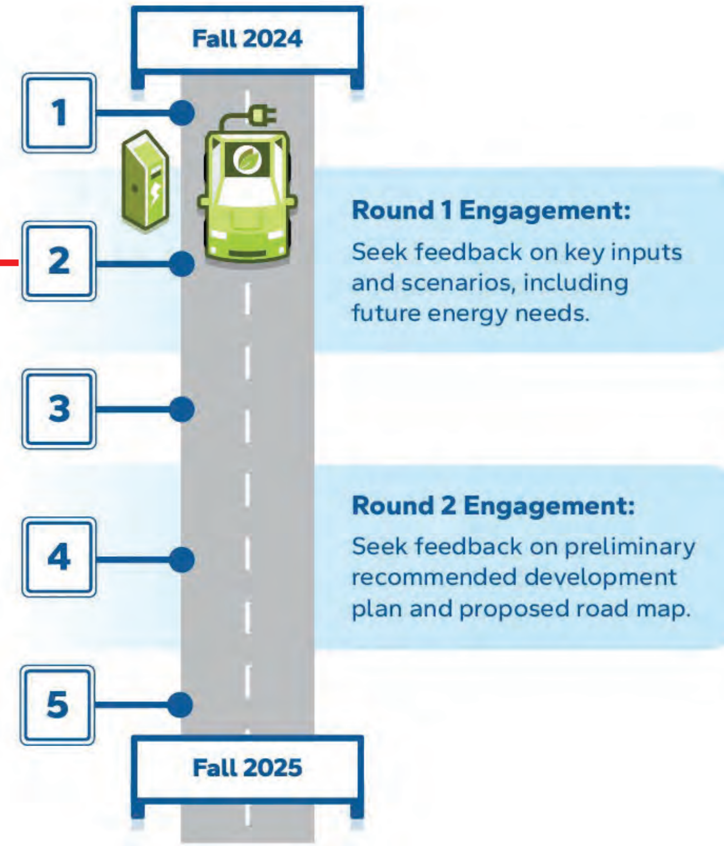
Step 1. Setting direction

Step 2. Develop key inputs and scenarios
- Planning assumptions
- Key inputs
  - Load projections
  - Resource options strategies
- Scenarios
- Establish evaluation metrics

Step 3. Modelling, analysis and evaluations

Step 4. Recommended development plan

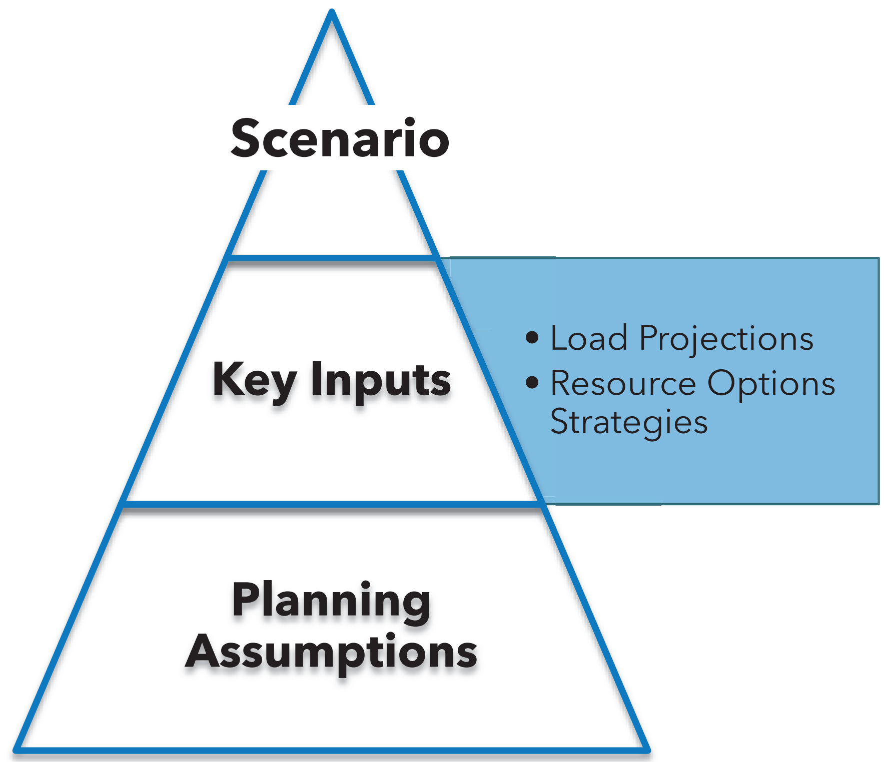
Step 5. Finalize the Integrated Resource Plan



Developing key inputs and scenarios

Underpinned by planning assumptions

- The **planning assumptions** underpin the key inputs.
- **Key inputs** for the 2025 IRP include:
  - **Load projections**
  - **Resource options strategies**
- A **load projection** and a **resource option strategy** are combined to create an energy future **scenario**.



Key inputs and scenarios

Load Projections

- Anticipated electrical demand and natural gas demand.
- Based on planning assumptions.

+

Resource Options Strategies

- Represents potential policy impacts that limit what resources can serve future demand.
- Based on planning assumptions.

=

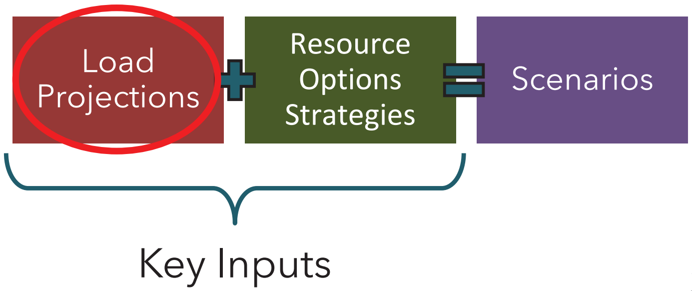
Scenarios

- Represents a specific energy future.
- It is a likely combination of a Load Projection and a Resource Options Strategy.

Key Inputs

Load Projections

Key Inputs



Load projections

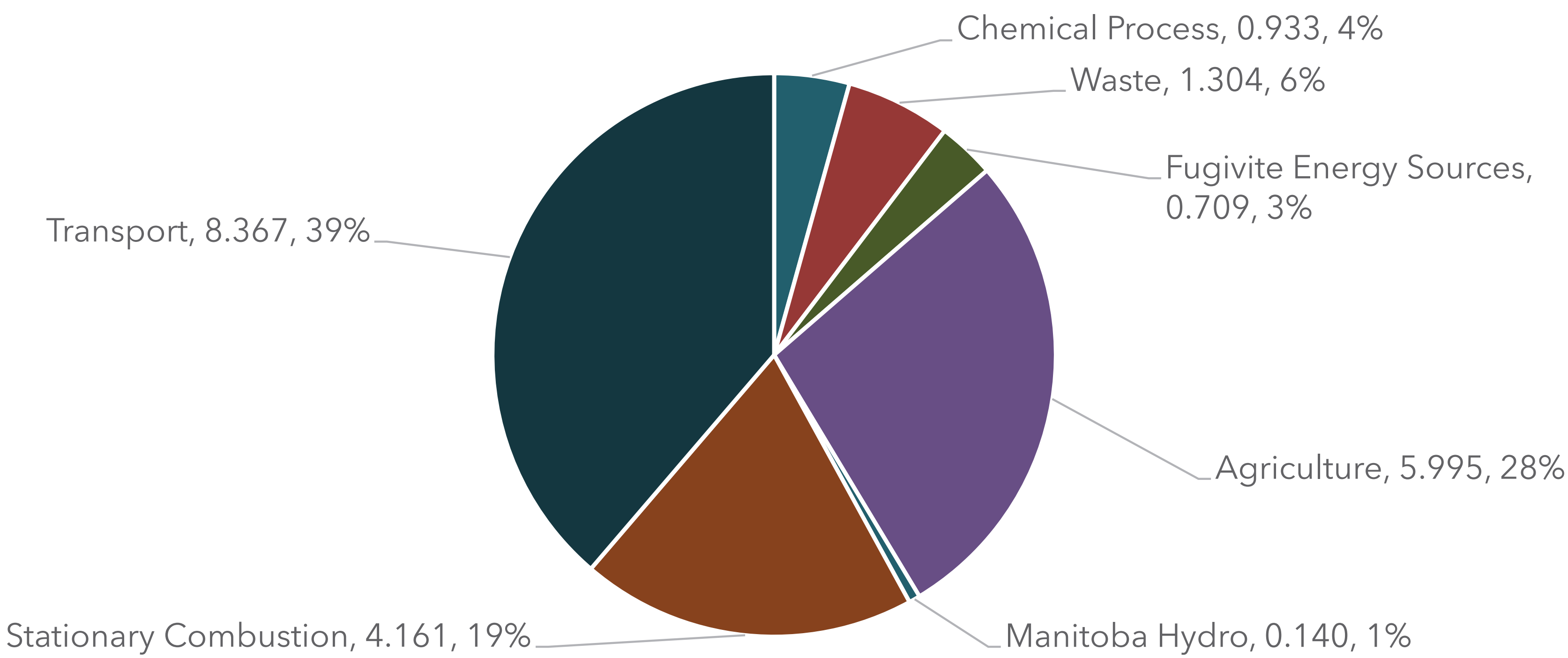
Overview

- Load projections show the energy demand Manitoba Hydro might be required to serve.
- Planning assumptions are common between electricity and natural gas.
- The net-zero economy by 2050 future is uncertain and could result in a range of electricity and natural gas demand that needs to be served by Manitoba Hydro.
- Three proposed load projections:

Load Project	Assumes…
1 - Baseline	Minimal changes from current policies and customer decisions.
2 - Medium	Moderate impact from government actions and customer decisions.
3 - High	Significant impact from government actions and customer decisions.

Manitoba Greenhouse Gas Emissions

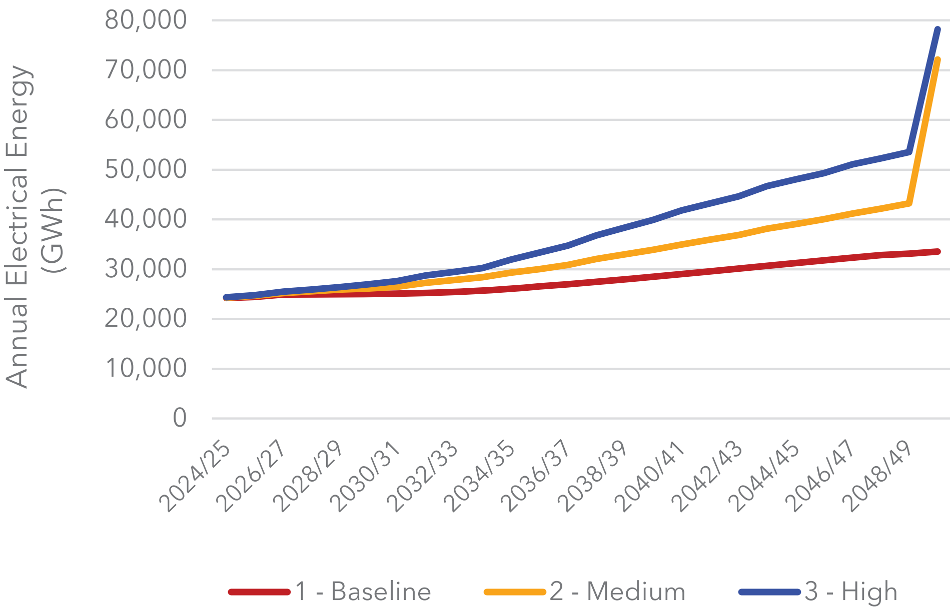
Average Manitoban GHG Emissions Between 2018 - 2022 (21.6 Mt per year)

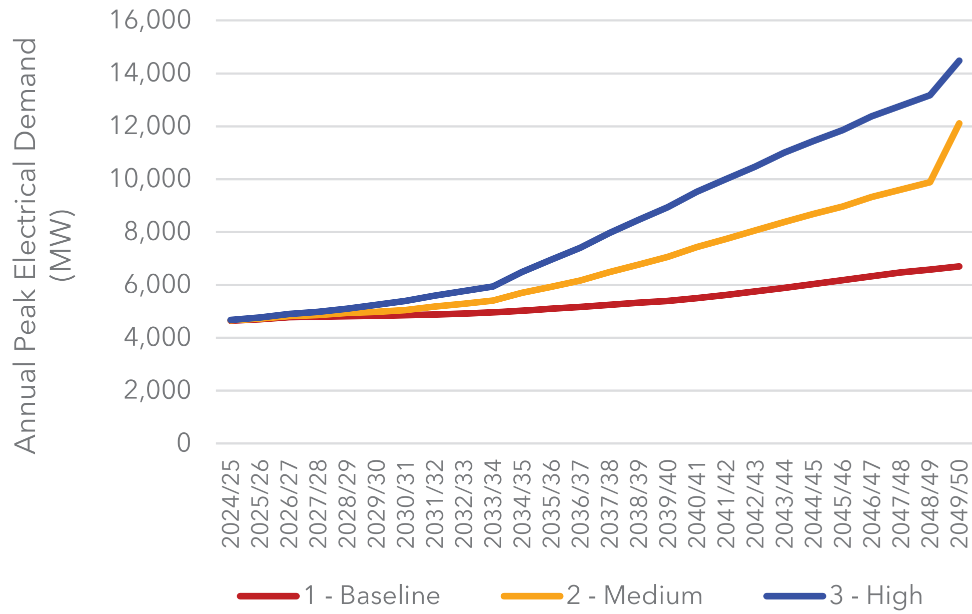


Further descriptions of the categories and subcategories found in Table A9-1 in the NIR Part 3
https://publications.gc.ca/collections/collection_2024/eccc/En81-4-2022-3-eng.pdf

Proposed load projections

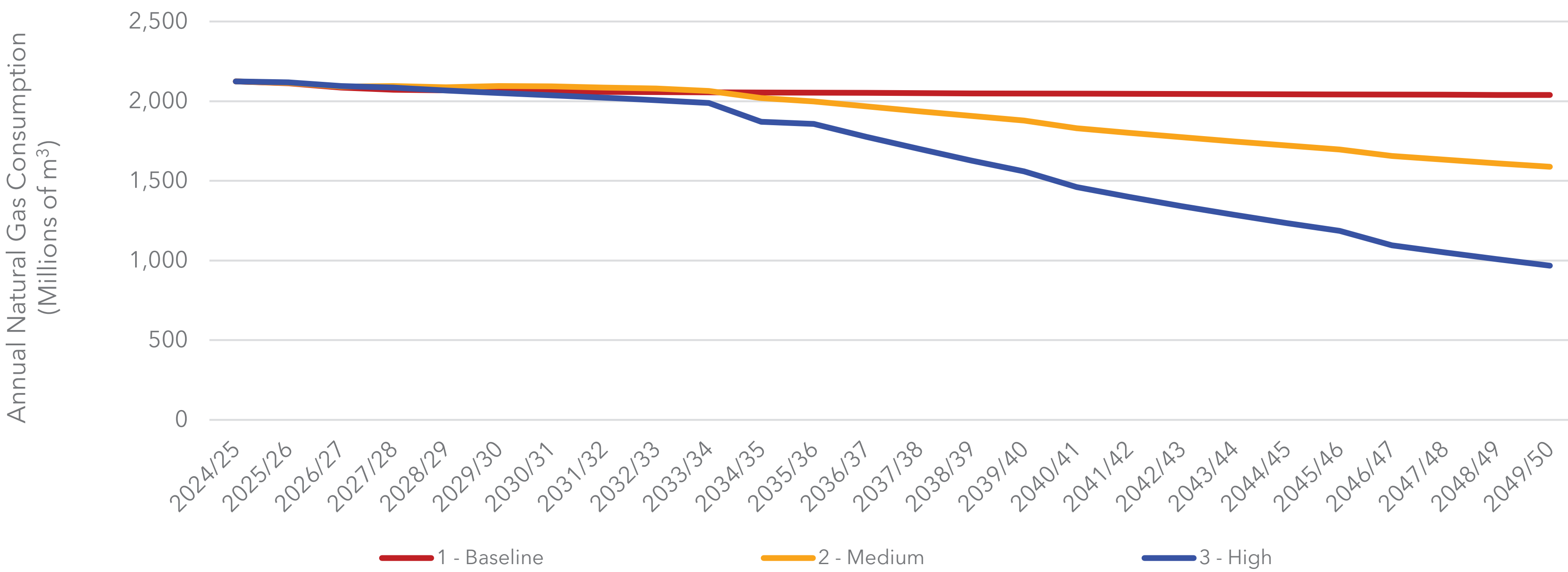
Electric energy and demand (net of Efficiency Manitoba Plan)



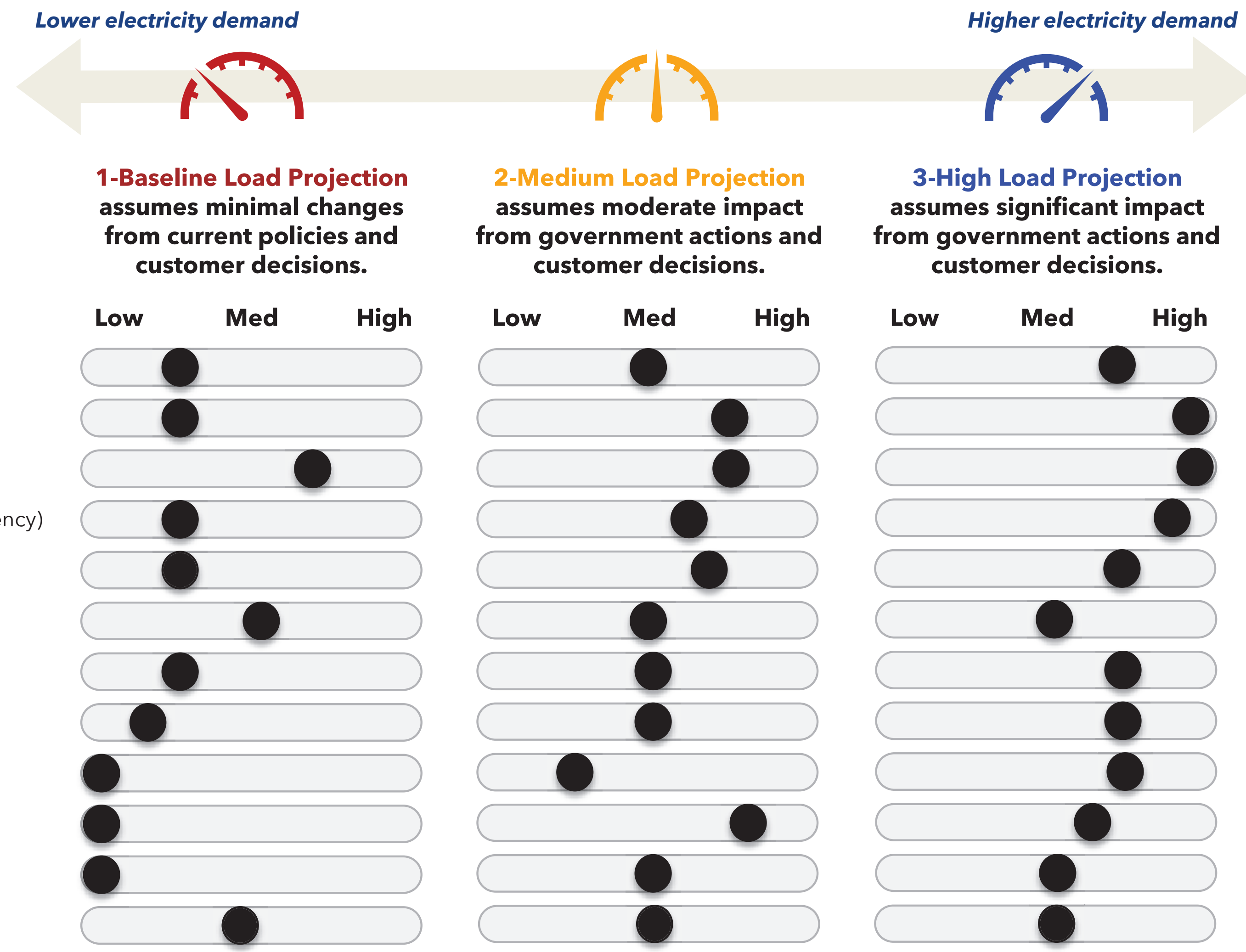


Proposed load projections

Natural gas (net of Efficiency Manitoba Plan)



Proposed assumptions for the load projections



Economic growth

Energy Policy (incl. GHG policy)

Electrification of Transportation

Space Heating (electrification, ASHP, GSHP, energy efficiency)

Customer Self-Generation & Storage (e.g. solar)

Energy Efficiency (incl codes & standards, base EM plan)

Industrial Decarbonization

Industrial Economic Development

Hydrogen Production

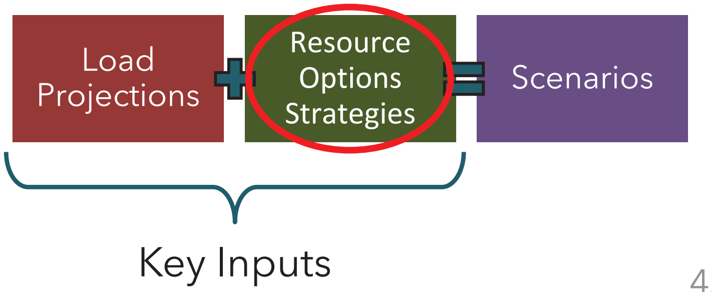
CO_2 Capture

RNG & Hydrogen

Demand Response

Resource Options Strategies

Key Inputs



Resource options strategies

Overview

- Resource options strategies reflect the potential ways Manitoba Hydro may be required to meet electricity and natural gas demand.
- Policy is a key driver that influences what resources may be allowed to serve energy needs.
- The strategies are based on the full inventory of resource options available to meet future energy needs in Manitoba.
- The different strategies reflect a range of potential policies that could influence the resource options.

Proposed resource options strategies

Four proposed strategies and their assumptions

Resource Options Strategies		Assumptions
A	Technology Neutral	Compliant with federal Clean Electricity Regulations.
B	Net-Zero Grid 2035	Strategy A, plus requirement that electricity grid is net-zero by 2035.
C	Near Term Wind Generation Projects	Strategy B, plus up to 600 MW of Indigenous majority owned wind with dispatchable resources for reliability.
D	No Fuel-Based Resources	Strategy B, plus requirement of no fuel-based combustion turbines post 2035 (i.e. no natural gas, hydrogen, biomethane, or biomass generation).

Resource options strategies

Examples common planning assumptions

Electricity and natural gas system characteristics

- System hydrologic inflows
- Current power generation supply mix
- Interconnections with neighbouring markets

Modelling and analysis parameters

- Transmission planning criteria
- Generation planning criteria for dependable energy and capacity
- Fuel availability and cost (e.g. natural gas, biomethane)
- Demand driven natural gas and electric delivery system costs
- Firm export contracts are not renewed
- Demand side resources (e.g. Efficiency Manitoba plan, demand response)

Resource options inventory

Resource options inventory

A common planning assumption

Dispatchable & Mature

Intermittent & Mature

Dispatchable & Emerging

New Hydropower

Upgrade Existing Hydropower

Wind

Solar

Energy Efficiency

Short Term

Long Term

Batteries

Natural Gas Fueled Combustion Turbine

Natural Gas Fueled Combustion Turbine With Carbon Capture

Biomass Fueled Steam Turbine

H_2

Hydrogen Fueled Combustion Turbine

Market Purchases (Imports)

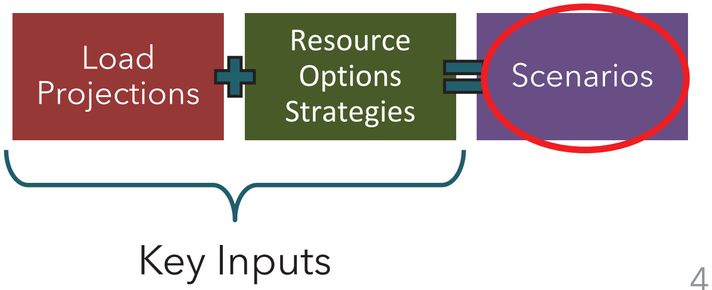
Small Modular Nuclear Reactors

All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in service.**

This list shows all potential resource options available, however, some may not be available under specific Resource Options Strategies.

Scenarios

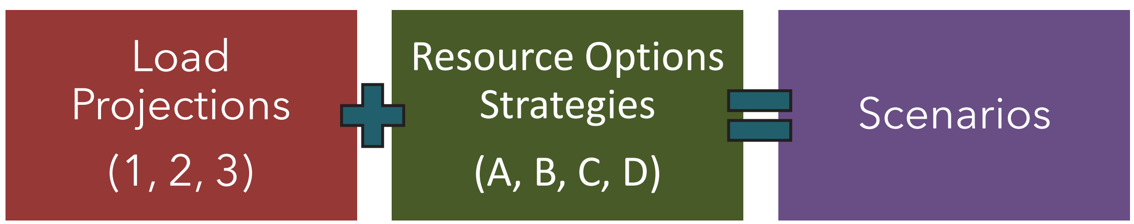
Including Sensitivities



Scenarios

Overview

- Scenarios are a likely combination of a Load Projection and Resource Options Strategy.
- Scenarios represent the energy futures.
- Aiming to have a group of scenarios that together, represent a reasonable range of what the energy future might look like in Manitoba.



Proposed scenarios

Eight proposed scenarios represent different energy futures

Resource Options Strategies	Load Projections		
	1 - Baseline	2 - Medium	3 - High
A - Technology Neutral	S1A	-	-
B - Net-Zero Grid 2035	S1B	S2B	S3B
C - Near Term Wind Generation Projects	S1C	S2C	S3C
D - No Fuel-Based Resources	-	-	S3D

S = Scenario
Scenarios range from **1A to 3D**, where the number represents a **Load Projection** and the letter represents the **Resource Options Strategy**.

Only likely combinations of load projections and resource options strategies will be studied.

- Those proposed not to be studied are noted by (-).

Modelling and analysis approach

Potential development plans

- In the modelling and analysis, scenarios produce potential development plans.
- A development plan outlines the required steps to meet future energy needs.
  - It may include building new energy sources, infrastructure or programs to manage energy use during peak demand.
- Sensitivity analysis will test the robustness of the potential development plans against different risks.

Sensitivity analysis

Test key planning assumptions that have a high potential to impact results

Proposed sensitivities:

- Higher or lower market prices
- Increased capital costs for new resources
- Delays in new resource construction
- Lower or higher water inflow conditions (climate change)
- New hydrogeneration and capacity enhancements at existing hydro stations

Not all sensitivities will be run on every scenario.

Sensitivity analysis, or what-if analysis, helps us to understand how individual inputs or constraints change a development plan.

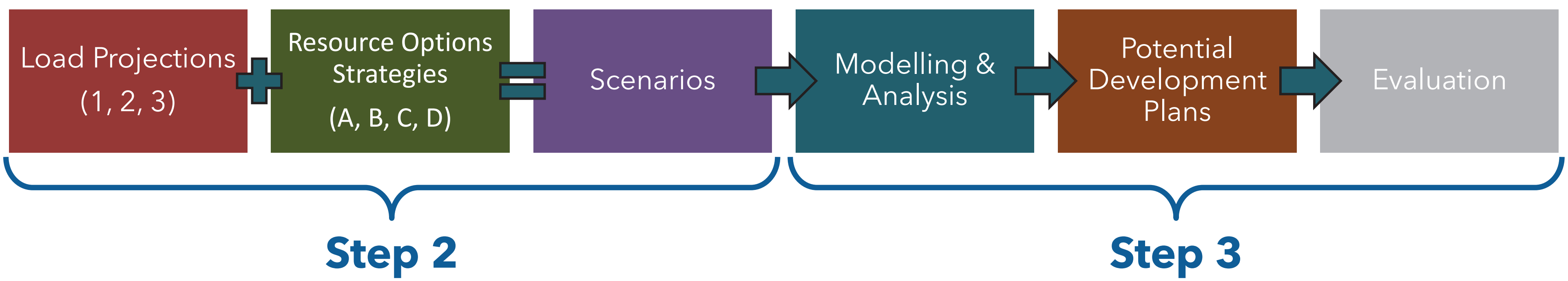
This means we can test the robustness of the outcomes against different risks and understand if that will change the outcomes.

Next steps towards evaluation

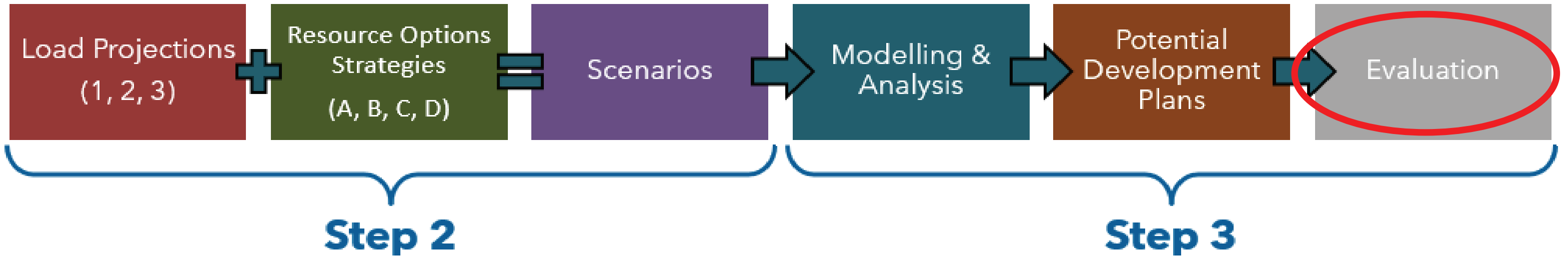
In Step 3 – Modelling, analysis and evaluations:

- Approximately 50+ scenarios and sensitivities will be analyzed.
- Result will be a series of potential development plans for evaluation.
- Evaluation includes applying evaluation metrics to these potential development plans.

In Step 2 – develop key inputs and scenarios, we establish the evaluation metrics to prepare for Step 3.



Evaluation Metrics



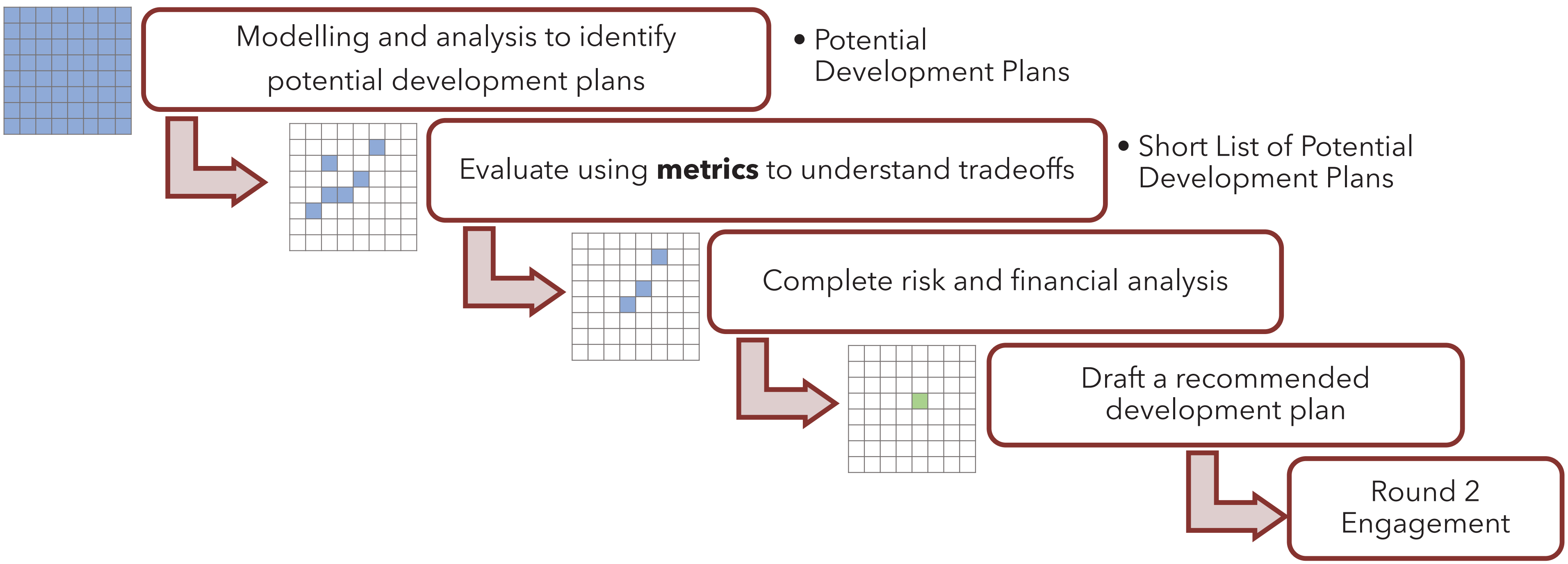
Evaluation metrics

What are evaluation metrics and how will they be used?

- **Modelling & Analysis** identifies cost-effective potential development plans that meet reliability planning criteria, mandates and regulations.
- **Evaluation** narrows the list of potential development plans towards a recommended development plan using evaluation metrics.
- **Evaluation Metrics:**
  - reflect what Manitobans have shared are important factors for them.
  - are used to compare and assess trade-offs between potential development plans.
  - can be numbers-based (quantitative) or descriptions (qualitative).
  - need to be established early in the process ahead of evaluation taking place.

Evaluation methodology

This is how we use the evaluation metrics



Proposed evaluation metrics

Four themes that reflect previous research and engagement

Reliability

Adequate Supply

Resource Diversity

Technology Maturity

Costs

Net System Costs

Customer Direct Costs

Environmental

GHG Emissions

Environmental Considerations

Social

Economic Reconciliation

Socio-Economic Benefits

Proposed reliability evaluation metrics

Proposed descriptions

Adequate Supply: Ability for energy supply to meet future demand

- This metric will consider the ability to meet future energy needs at time of peak demand, and to ensure reliable operations during drought.

Resource Diversity: Potential to diversify resources in our existing systems

- This metric will compare how new resources can mitigate exposure related to any one specific resource (e.g., regulatory change, fuel supply risk, water supply variability)

Technology Maturity: Consideration of the risks and opportunities of various technologies

- This metric will compare the maturity, and consider the risks, of established technologies and emerging technologies.

Qualitative metric   Quantitative metric

Proposed cost evaluation metrics

Proposed descriptions

Net System Costs: An estimate of the total costs to supply electricity and natural gas.

- This metric will be used to compare the need for revenue to cover total costs.
- This will be expressed as both a cumulative net present value and as an annual value.

Customer Direct Costs: An estimate of direct customer cost impacts.

- This metric will be used to compare the potential direct energy related incremental costs to customers as a result of a development plan, such as new appliances or heating systems needed.

Qualitative metric Quantitative metric

Proposed environmental evaluation metrics

Proposed descriptions

GHG Emissions: An estimation of future greenhouse gas emissions

- This metric will be used to compare incremental emissions impacts between potential development plans.

Environmental Considerations: The potential effects on the environment

- This metric will help understand differences from a broad perspective and will include potential effects on the air, land, water, and people.

Qualitative metric Quantitative metric

Proposed social evaluation metrics

Proposed descriptions

Economic Reconciliation: Potential for future partnerships and other opportunities that benefit Indigenous communities, peoples, and businesses

- This metric will be used to compare the potential to support job creation, advance training opportunities, support business development, and ownership of new generation projects.

Socio-Economic Benefits: Future potential benefits to the Manitoba economy and community well-being

- This metric will be used to compare potential benefits such as economic development and job creation associated with the construction and operation of new resources in the development plan.

Qualitative metric Quantitative metric

Next Steps

Next Steps: shaping our energy future together

What's next?

- Finalize the 2025 IRP Terms of Reference.
- Meeting notes and presentation to be shared.
- November 21, 2024 - Meeting #2 – Key Inputs
- December 2, 2024 - Meeting #3 – Scenarios and Evaluation Metrics

Let's talk about the future

- Complete our customer survey by December 19, 2024: hydro.mb.ca/future
- Questions or comments? Email us at: IRP@hydro.mb.ca

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Technical Advisory Committee
Fall 2024 – Meeting 2

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
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Land acknowledgment

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, Cree, Anishininew, Dakota, and Dene peoples and the homeland of the Red River Métis.

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.

Agenda

Purpose:
Seek member feedback on planning assumptions that inform key inputs

Topics

1. Updates from TAC meeting #1
2. Terms of Reference - Updates
3. 2025 IRP Proposed Load Projections
   - Development Approach
   - Load Projections
   - Planning Assumptions
4. Resource Inventory & Proposed Resource Option Strategies

A note about information included in this document

All information included in this documented is presented as proposed, draft, and/or preliminary. Discussion and feedback is welcomed to inform finalized versions of this information.

Manitoba Hydro is committed to continuing to ensure transparency of our energy planning process. This includes engaging with customers and interested parties in the development of the IRP, so it is informed by feedback heard.

Finalized key inputs, scenarios, and evaluation metrics will be communicated after the planned engagement concludes, including how feedback was incorporated.

Load Projections and Resource Options

For today's conversation

INFORM & ENGAGE

Load Projections

- Anticipated electrical demand and natural gas demand.
- Based on planning assumptions.

+

INFORM

Resource Options Strategies

- Represents potential policy impacts that limit what resources can serve future demand.
- Based on planning assumptions.

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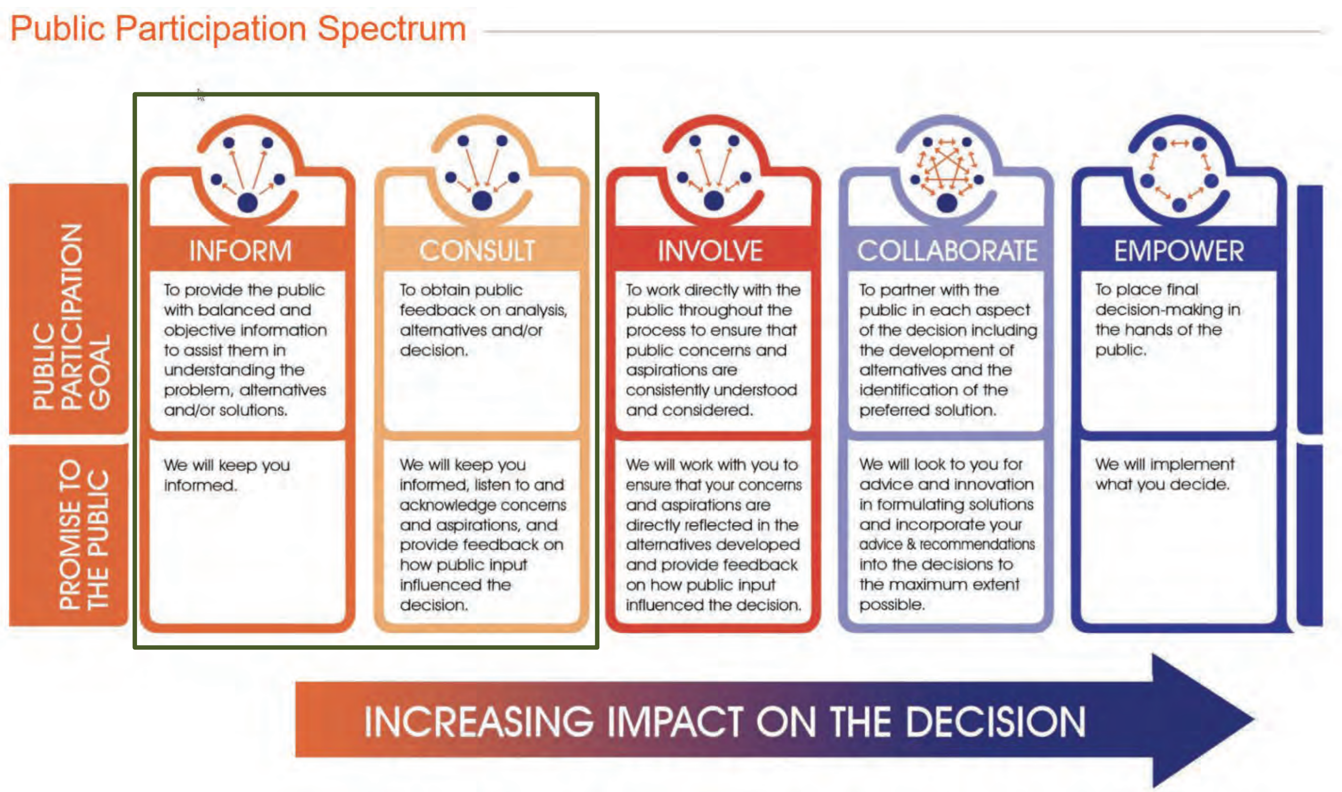
Scenarios

- Represents a specific energy future.
- It is a likely combination of a Load Projection and a Resource Options Strategy.

Key Inputs

Updates from TAC Meeting #1

Engagement in the 2025 IRP



Terms of Reference - Updates

Proposed changes based on discussion

Purpose

What we heard:	Proposed Changes

• Need to clarify TAC purpose & expectations of members:
  • Are representative or independent perspectives sought. Impacts demands of group members.
  • Group members to provide engagement feedback that Hydro will use to inform decision-making.
  • Group members will not be required to reach consensus or make formal recommendations.
  • Participation of members is considered engagement - not Crown consultation.
	The 2025 IRP will ~~result in a road map, which includes a recommended development plan,~~ **be** informed by TAC ~~feedback~~ and other ~~public~~ engagement ~~feedback~~. The TAC is ~~intended to provide~~ **designed to gather** feedback **from representative organizations across Manitoba, with members sharing their knowledge and expertise from their role(s) within the organization** ~~the group~~ they represent. Feedback shared from the TAC will be considered by Manitoba Hydro along with feedback heard through other 2025 IRP engagement. The TAC will not be required to reach consensus and will not be responsible **or accountable** for decisions **or determining a recommended development plan** within the 2025 IRP. **Participation on the TAC is an engagement effort and is not considered Crown Consultation.**

Purpose

What we heard:	Proposed Changes

• Need to clarify TAC purpose & expectations of members:
  • Are representative or independent perspectives sought. Impacts demands of group members.
  • Group members to provide engagement feedback that Hydro will use to inform decision-making.
  • Group members will not be required to reach consensus or make formal recommendations.
  • Participation of members is considered engagement - not Crown consultation.
	The TAC will bring together a range of perspectives and foster comprehensive dialogue on various components of the 2025 IRP. ~~Consultation~~ **Engagement** with the TAC is one part of province-wide engagement to seek feedback more broadly with the public, customers and interested parties in Manitoba.

Membership Criteria

What we heard:	Proposed Changes
• It's important to clarify if group members are bringing their individual expertise or a collective perspective from their organization. • Consider how participants' organizations may be impacted by Manitoba Hydro's energy planning. • "Aids" should be changed to "impacts".	**TAC** membership includes ~~a cross-section of~~ knowledgeable participants that have significant interest or experience with Manitoba Hydro's Integrated Resource Planning processes. Specifically, membership is chosen considering the following criteria: • Can bring a representative ~~or collective~~ perspective to the discussion. • Have a broad focus and interest (based on **the organization's** mandate or research) on long-term energy planning, or knowledge of key factors that could influence energy use in Manitoba. • ~~Having~~ **Have** an understanding of **how** Manitoba Hydro's long-term energy planning aids **and/or impacts** their organization's mandate and objectives. • Have a demonstrated interest in Manitoba Hydro's long-term energy planning through involvement in previous Manitoba Hydro IRPs by and/or Public Utilities Board processes.

Responsibilities of Membership and Group Protocols

What we heard	Proposed Changes
• The level of expectation around participation and alternates should be clarified.	• Members are ~~expected~~ **asked** to attend all scheduled meetings **to ensure consistent participation and build the team.** If unable to attend, members ~~should~~ **may** provide an alternate attendee and ~~brief them~~ **share** previous ~~discussions and~~ **TAC** materials **with the alternate**.
• It should be clarified if this is a requirement or if relevant materials will be reviews in the meetings.	• **To support the discussion, Manitoba Hydro may provide materials in advance of the meetings.** Members ~~should take time~~ **are** encouraged to review **this** material~~s~~ provided **in advance** to enable active participation ~~in discussions~~.
• This bullet should be split into two parts. The first part should focus on a two-way dialogue, the second should focus on creation of a safe space to share those perspectives.	• Members ~~should~~ **are encouraged to** actively **and respectfully** participate in discussions ~~and must communicate respectfully, enabling a two-way dialogue~~. **Not all members may be able to participate in every discussion.** • **Members should strive for** a welcoming and inclusive environment ~~for diverse perspectives~~.

Responsibilities of Membership and Group Protocols

What we heard	Proposed Changes
• It's important to clarify if group members are bringing their individual expertise or a collective perspective from their organization.	• Each member of the ~~Committee~~ **TAC** shall conduct themselves honestly, fairly, ethically and with integrity and be respectful of one another, Manitoba Hydro staff and group facilitators. Potential conflicts of interest must be ~~identified~~ **reported to the Chair and will be disclosed** to the ~~group~~ **TAC**.
	• Clarified under group purpose section: ~~Each member must bring the perspectives of the organization or sector they are representing and commit to sharing back to the organization they represent. All members are required to be respectful of other TAC members and perspectives raised throughout the process.~~ • **Consultants of the Public Utilities Board are participating as observers. While they may provide guidance on the scope of matters to be included in the IRP, they will not provide substantive advice or recommendations on how Manitoba Hydro should meets its resource needs.**

Responsibilities of Manitoba Hydro

What we heard	Proposed Changes
• Important to clarify what "where appropriate" means. In what situations would feedback not be considered appropriate?	• Review **the** feedback ~~from~~ **by** TAC ~~members~~ and be accountable to share ~~back~~ **what was heard, what we did and the rationale.**~~be accountable to share back how it was considered within the IRP where appropriate.~~ **For example, feedback may be considered in the IRP or other Manitoba Hydro work.**
• Post all TAC meeting materials and presentations to the Manitoba Hydro public website.	• Post all TAC ~~meeting~~ materials~~, presentations,~~ **and external meeting notes** to the Manitoba Hydro public website. **Materials will not attribute comments to individual TAC members or the organizations they represent.**

Responsibilities of Manitoba Hydro

What we heard	Proposed Changes
• Include the same conduct responsibilities for Manitoba Hydro that are in the member section.	**Added:** • **Actively participate in discussions and must communicate respectfully, enabling a two-way dialogue.** • **Ensure a welcoming and inclusive environment for diverse perspectives.** • **Conduct themselves honestly, fairly, ethically and with integrity and be respectful of one another, TAC Members, other Manitoba Hydro staff and group facilitators. Potential conflicts of interest must be identified to the group.** • **Be respectful of other TAC members and perspectives raised throughout the process.**

Committee Feedback

What we heard	Proposed Changes
• Clarify what is meant by the term "formally"	**Move to "Member Responsibilities" section:** TAC ~~membership~~ **members** are **invited** to ~~formally communicate~~ **provide feedback** during ~~the scheduled~~ meetings. **If TAC members would like feedback specifically noted in meeting notes, please advise Manitoba Hydro either during the meeting or by email at IRP@hydro.mb.ca. Additional feedback may also be provided by email.** ~~any feedback or recommendations for Manitoba Hydro to review so it can be documented in the meeting notes.~~

INFORM

Proposed Load Projections

Guiding Principles and Development Approach

Guiding Principles for the 2025 IRP Load Projections

- Capture a **broad range of potential futures** for both electricity and natural gas.
- **Leverage key learnings from 2023 IRP** in developing planning assumptions for each load projection.
- **Limit the premature removal of existing systems** that have not reached end of life.
- Develop a **baseline projection** with limited changes to how Manitobans use electricity and natural gas.
- Ensure **two load projections support** achieving a **net-zero economy by 2050**, highlighting different pathways to a net-zero economy by 2050.

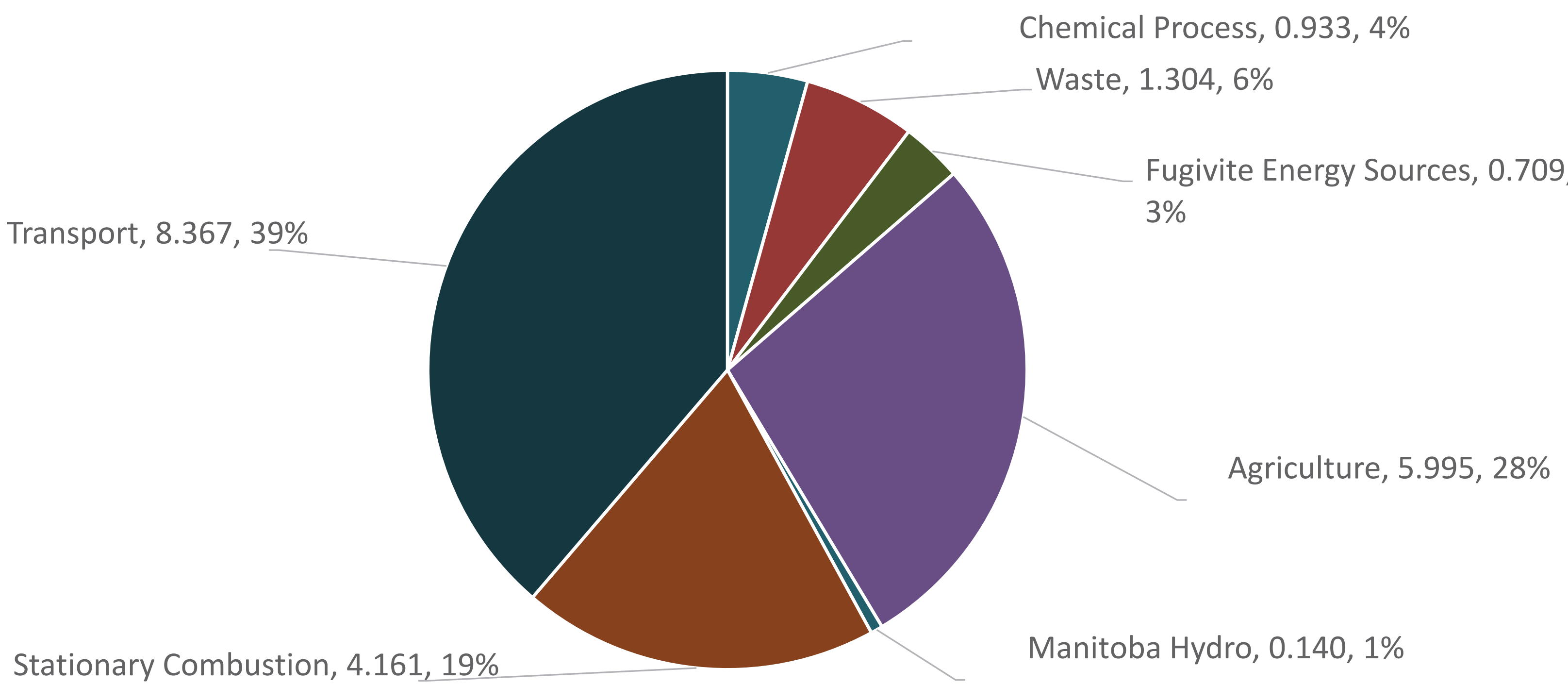
Assumptions to Achieve a Net-Zero Economy in Manitoba

Assumed that a net-zero economy by 2050 in Manitoba will…

1. Have **lower fossil fuel** use than current levels.
2. Have **lower non-combustion emissions** than current levels.
3. Rely on **Manitoba produced biofuels and hydrogen.**
4. Rely on **Manitoba based offsets and CO_2 removals.**
5. Net **any remaining** fossil fuel combustion emissions, and non-combustion emissions, to zero in 2050.

Manitoba Greenhouse Gas Emissions

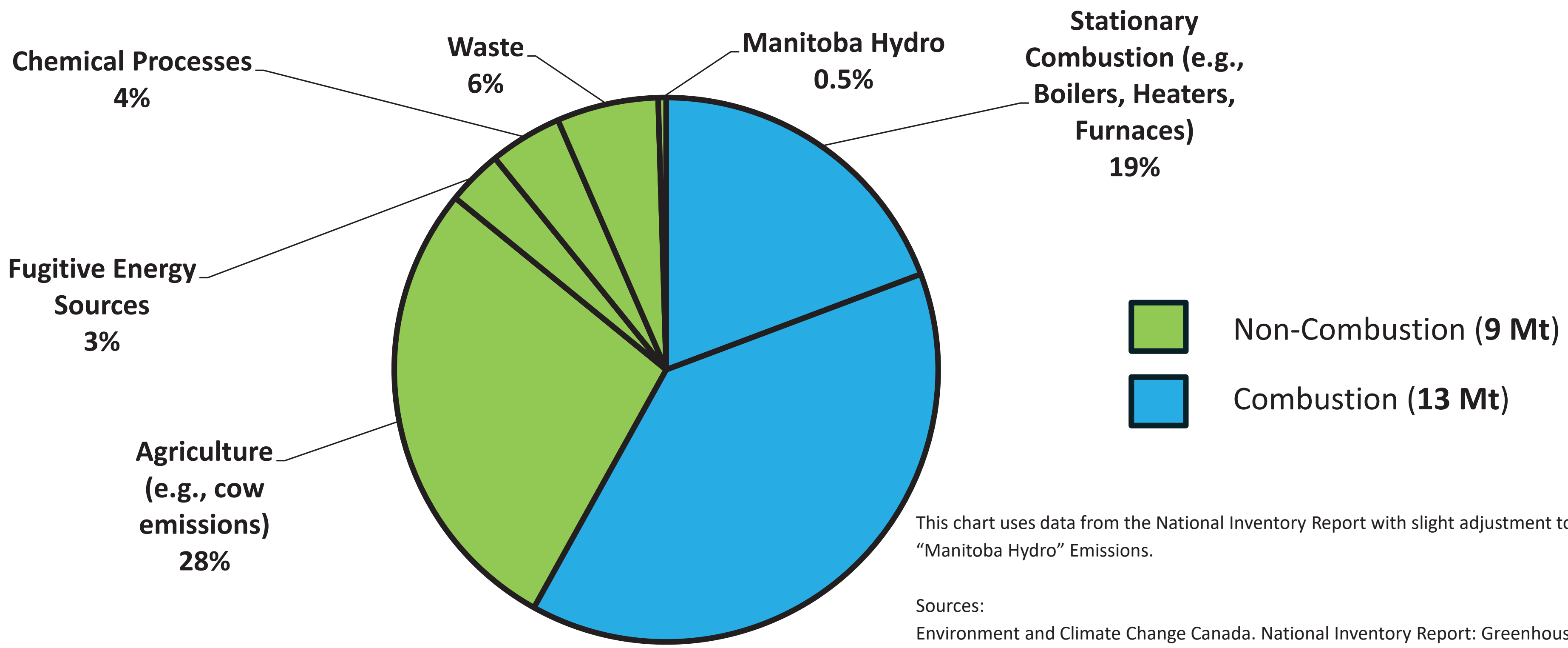
Average Manitoban GHG Emissions Between 2018 - 2022 (21.6 Mt per year)



Further descriptions of the categories and subcategories found in Table A9-1 in the NIR Part 3
https://publications.gc.ca/collections/collection_2024/eccc/En81-4-2022-3-eng.pdf

Economy Wide Emissions That Would Need To Be Netted To Zero

Manitoba Emissions (2018-2022 average)



This chart uses data from the National Inventory Report with slight adjustment to separate out "Manitoba Hydro" Emissions.

Sources:

Environment and Climate Change Canada. National Inventory Report: Greenhouse Gas Sources and Sinks in Canada (1990-2022). 2024, https://publications.gc.ca/site/eng/9.506002/publication.html

https://www.hydro.mb.ca/environment/greenhouse-gas/

https://www.hydro.mb.ca/corporate/operations/generation/#brandon

Reducing Fossil Fuel Emissions Impacts Loads

GHG Reduction Option	Impact on Electrical Load	Impact on Natural Gas Load
1. Energy Efficiency (e.g., insulation)	Decrease ↓	Decrease ↓
2. Electrification	Increase ↑	Decrease ↓
3. Alternative Fuels (e.g., H_2)	Increase ↑	Decrease ↓
4a. Bioenergy with Carbon Capture & Storage (BECCS)	Decrease ↓	Neutral
4b. Other CO_2 Removal (e.g., Negative Emission) Technologies	Increase ↑	Neutral

Note: Options #1, #3 (and usually #2) do not reduce non-combustion emissions

Proposed Load Projections & Planning Assumptions

- Load projections show the energy demand Manitoba Hydro might be required to serve.
- Planning assumptions are common between electricity and natural gas.
- The net-zero economy by 2050 future is uncertain and could result in a range of electricity and natural gas demand that needs to be served by Manitoba Hydro.
- Three proposed load projections:

Baseline Load Projection
Assumes minimal changes from current policies and customer decisions.

Medium Load Projection
Assumes moderate impact from government actions and customer decisions and achieves economy wide net-zero by 2050.

High Load Projection
Assumes significant impact from government actions and customer decisions and achieves economy wide net-zero by 2050.

Key Planning Assumptions

Baseline	Medium	High
• Assume slightly lower economic growth	• Assume average economic growth	• Assume slightly higher economic growth
• Assume natural gas remains a viable option for Manitobans	• Strategically use natural gas to mitigate peak load implications	• Restricting the use of natural gas
• Limited industrial economic development and decarbonization by way of electrification	• Assume medium levels of industrial economic growth and decarbonization by way of electrification	• Assume higher levels of industrial economic growth and decarbonization by way of electrification
• No use of negative emissions technologies	• Achieve economy wide net-zero by 2050 with the use of negative emission technologies	• Achieve economy wide net-zero by 2050 with the use of negative emission technologies

Methodology for the 2025 IRP Load Projections

Key Planning Assumptions

- Key Assumptions that have the potential of changing how customers use energy into the future
- Include emerging technologies where models leveraging historical information may not capture

Load Forecast Modelling

- Economic Inputs from external Economic Forecasters
- Industry Standard Forecast Models by Customer Sector
- Hourly Zonal Forecasts developed
- Peak Forecasts based on Hourly Models

Load Projection

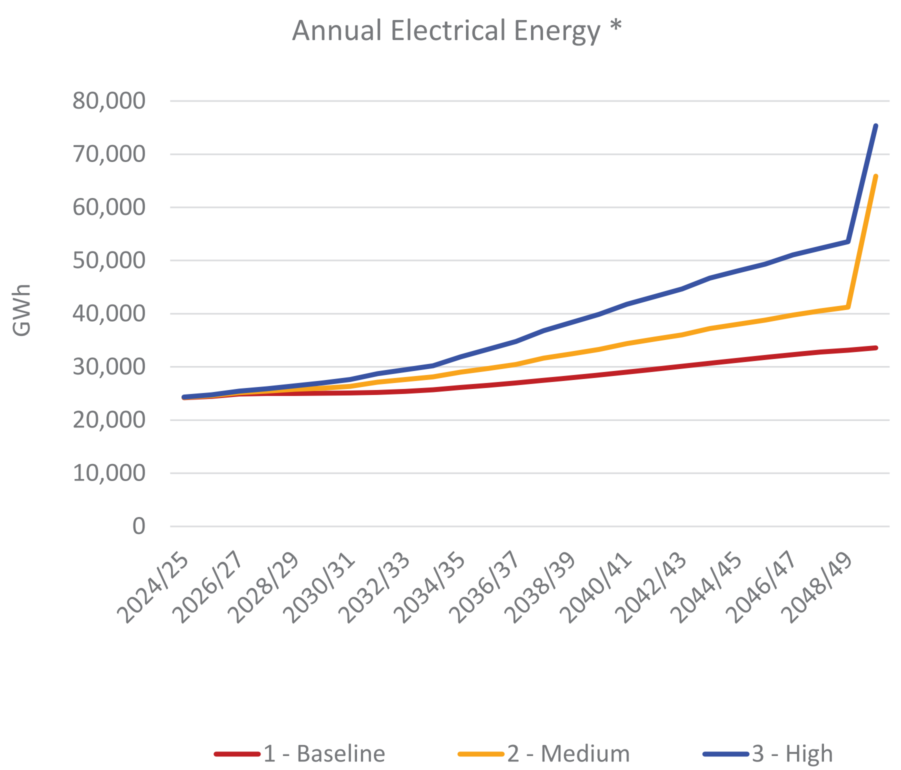
- IRP Electric Load Projection
- IRP Natural Gas Volume Projection

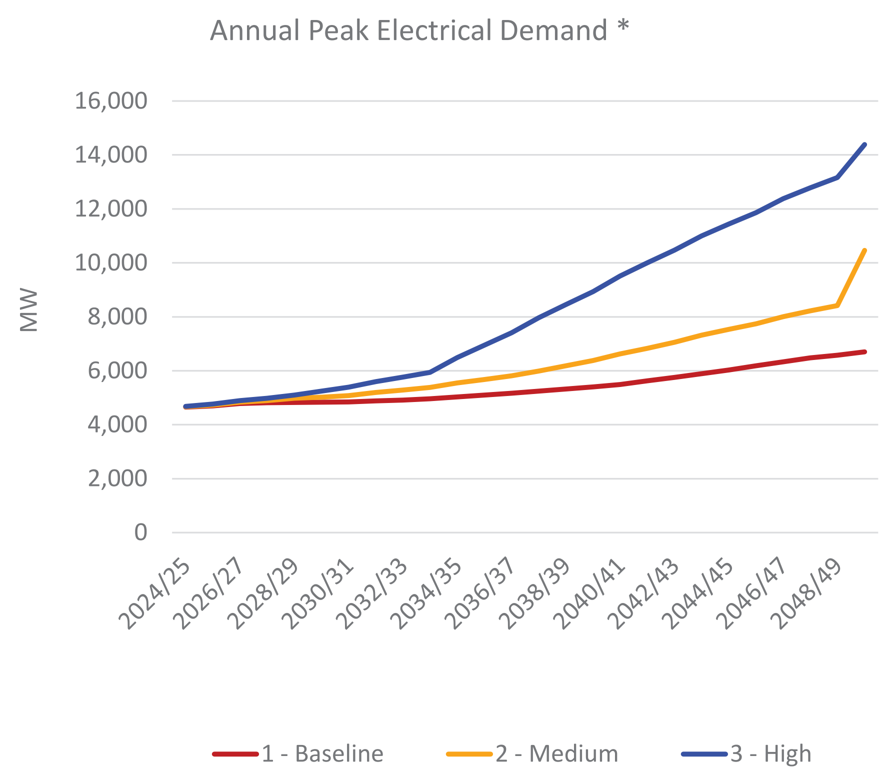
ENGAGE

Proposed Load Projections

Including Planning Assumptions

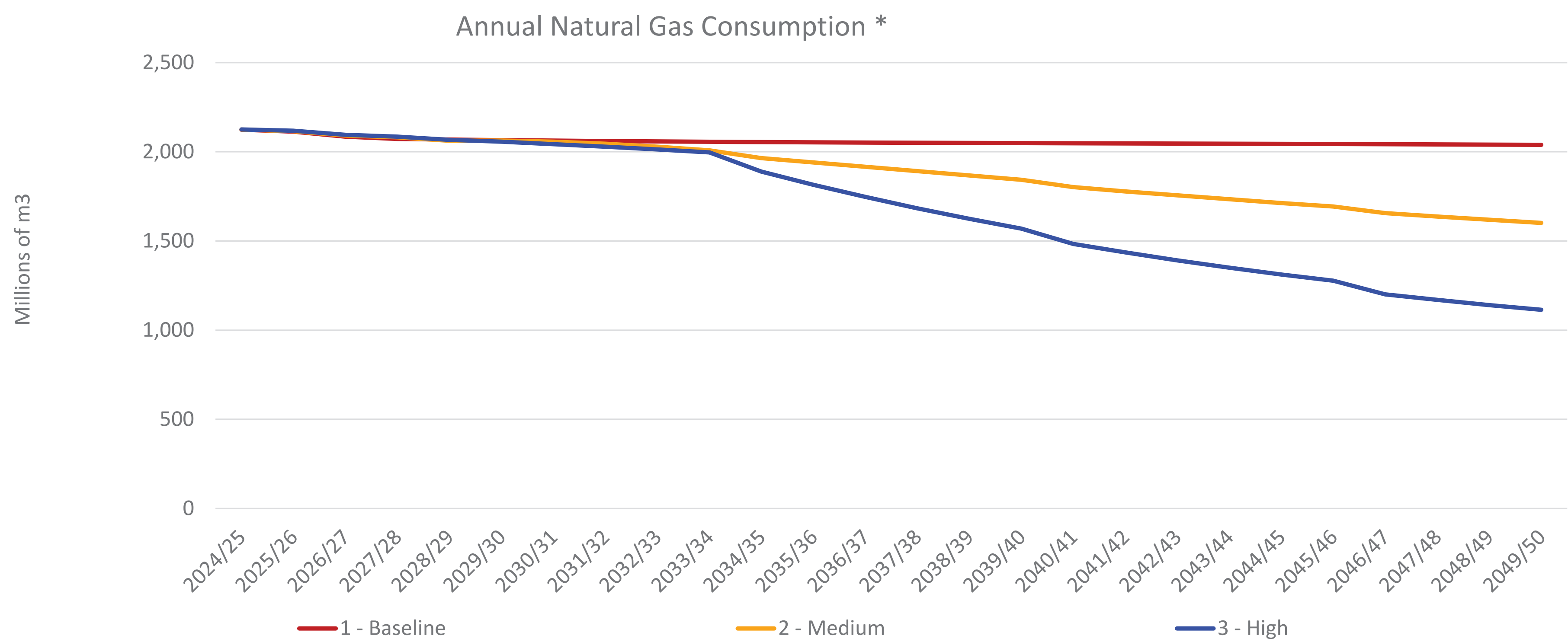
Electrical Energy and Peak Demand





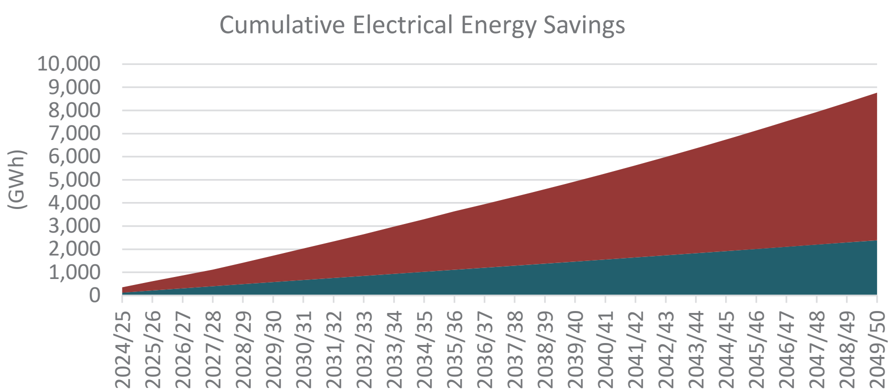
* Net of Energy Efficiency savings

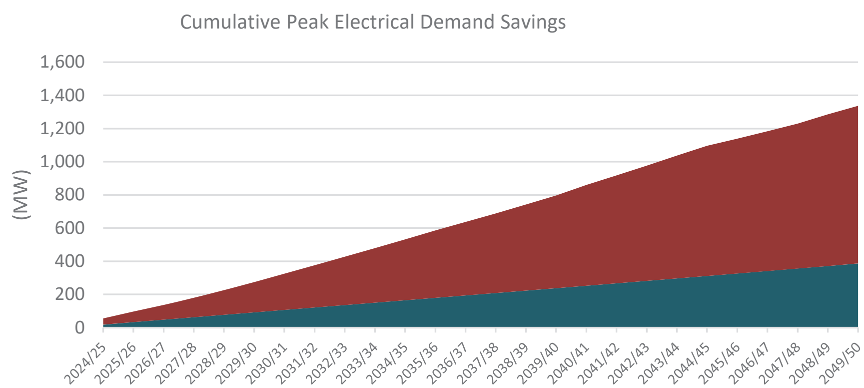
Natural Gas

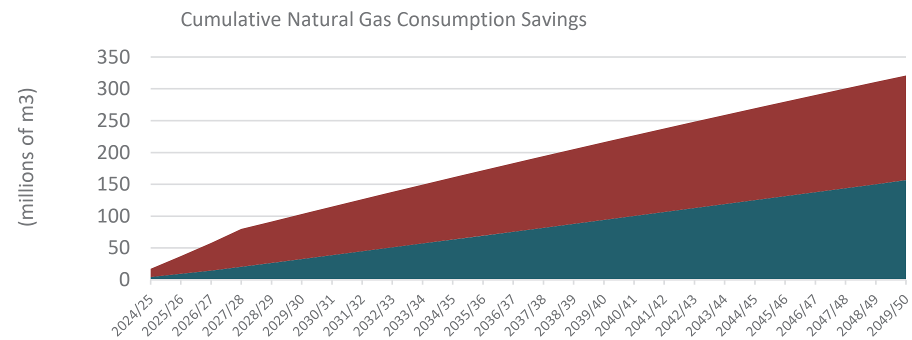


* Net of Energy Efficiency savings

Energy Efficiency







Note: Natural gas savings in the Medium and High Load projections have been adjusted to reflect the reduced natural gas volumes included in the Medium and High Load projections

■ Codes & Standards ■ Programs Based DSM

Planning Assumptions

We are looking for your feedback:

- To make sure we have captured a broad enough range in our load projections.
- To understand the factors that could impact the load projections.
- Key Planning Assumptions – 5 Breakout Discussions:
    - Electrification of Transportation
    - Space Heating
    - Industrial Decarbonization / Economic Development
    - Customer Self-Generation / Storage
    - Direct Air Carbon Capture

Explore key planning assumptions at each station:

- **What does [key planning assumption] look like in Manitoba leading up to 2050?**
- **What factors might influence [key planning assumption] in Manitoba?**
- **Are there any obstacles/barriers that could influence [key planning assumption]?**
- **Are there other factors we should be considering for [key planning assumption]?**

Are there other planning assumptions you would like to provide feedback on?

Proposed Planning Assumptions

Lower electricity demand *Higher electricity demand*

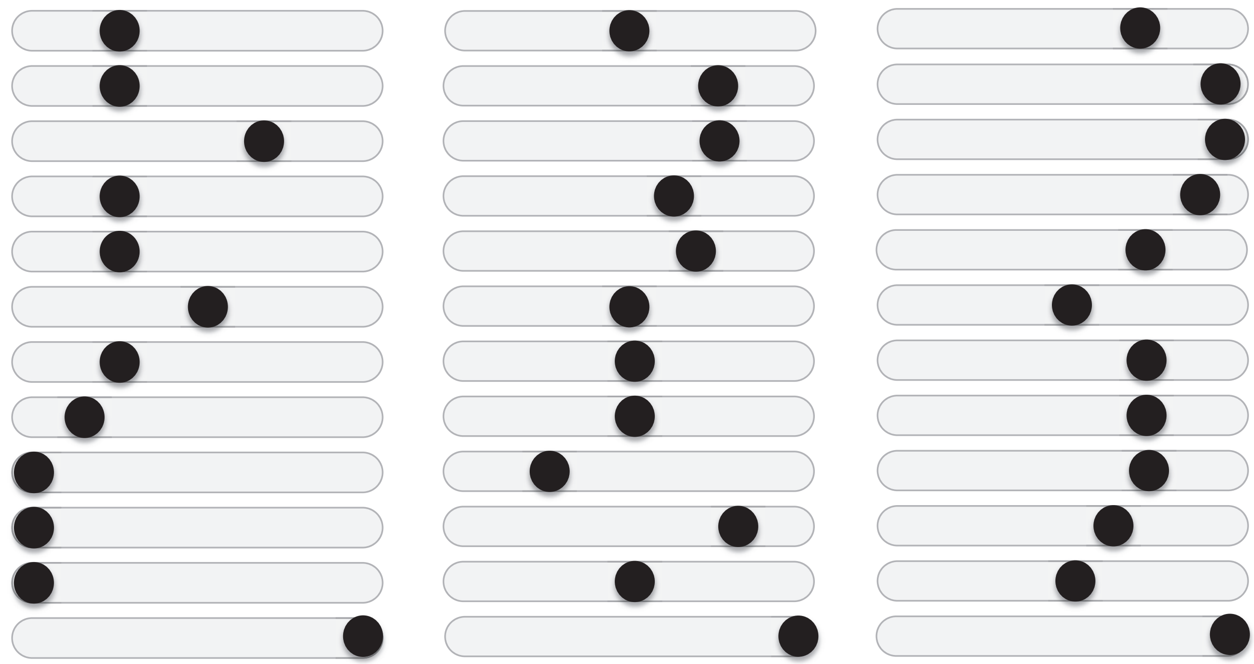
1-Baseline Load Projection assumes minimal changes from current policies and customer decisions.

2-Medium Load Projection assumes moderate impact from government actions and customer decisions.

3-High Load Projection assumes significant impact from government actions and customer decisions.

Low Med High | Low Med High | Low Med High

- **Economic growth**
- **Energy Policy** (incl. GHG policy)
- **Electrification of Transportation**
- **Space Heating** (electrification, ASHP, GSHP, energy efficiency)
- **Customer Self-Generation & Storage** (e.g. solar)
- **Energy Efficiency**
- **Industrial Decarbonization**
- **Industrial Economic Development**
- **Hydrogen Production**
- **CO_2 Capture**
- **Biofuels & Hydrogen**
- **Demand Response**



Electrification of Transportation

Zero-emission vehicle sales assumptions

	Baseline		Medium		High	
Type	**2034/35**	**2049/50**	**2034/35**	**2049/50**	**2034/35**	**2049/50**
Passenger Cars	100%	100%	100%	100%	100%	100%
Light Trucks	100%	100%	100%	100%	100%	100%
Medium	25%	80%	25%	90%	25%	100%
Heavy	10%	50%	18%	75%	25%	100%
Buses	40%	100%	40%	100%	40%	100%

To produce hydrogen through electrolysis, over twice the amount of electricity is required for the same level of km driven

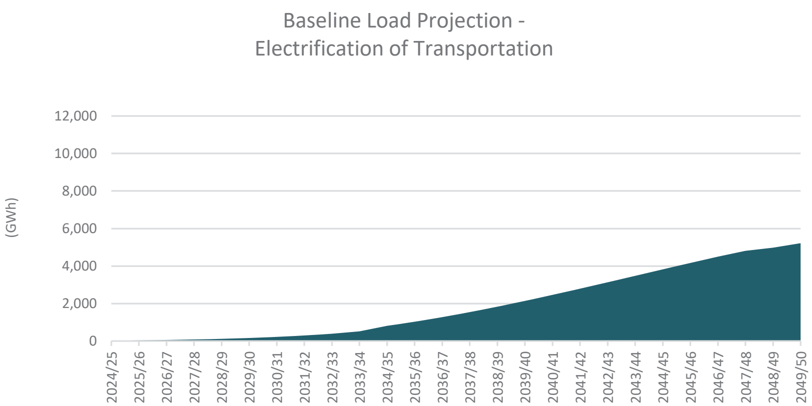
Medium and High Load Projections include the introduction of Hydrogen vehicles starting in 2034/35

Overall projections include:

- Electricity required to charge electric vehicles
- Electricity required to produce hydrogen to power H_2 vehicles

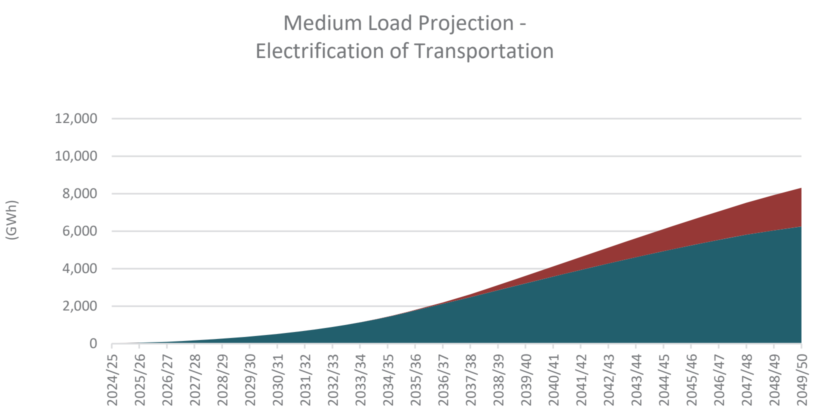
Type	Annual km driven	Annual kWh
Passenger Cars	15,000	3,225
Light Trucks	15,000	4,473
Medium	14,260	7,812
Heavy	88,615	135,612
Buses	55,000	78,160

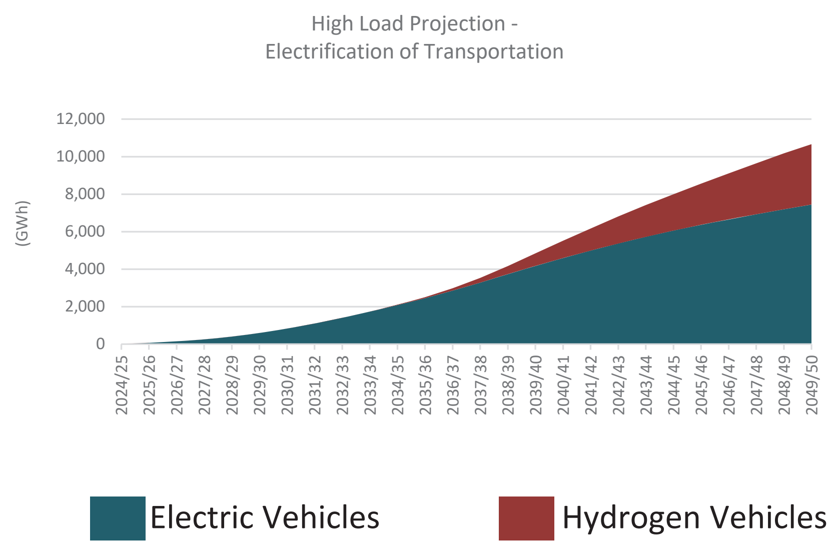
Electrification of Transportation



Projected forecast by 2049/50

	Baseline Load Projection	Medium Load Projection	High Load Projection
MW	+650	+1,040	+1,330
GWh	+5,200	+8,300	+10,650
Millions of m^3	n/a	n/a	n/a





Space Heating

- **Baseline Load Projection** - Customers are still selecting natural gas space heating and reflects an increase in the adoption of alternative technologies such air source heat pumps and cold climate air source heat pumps.

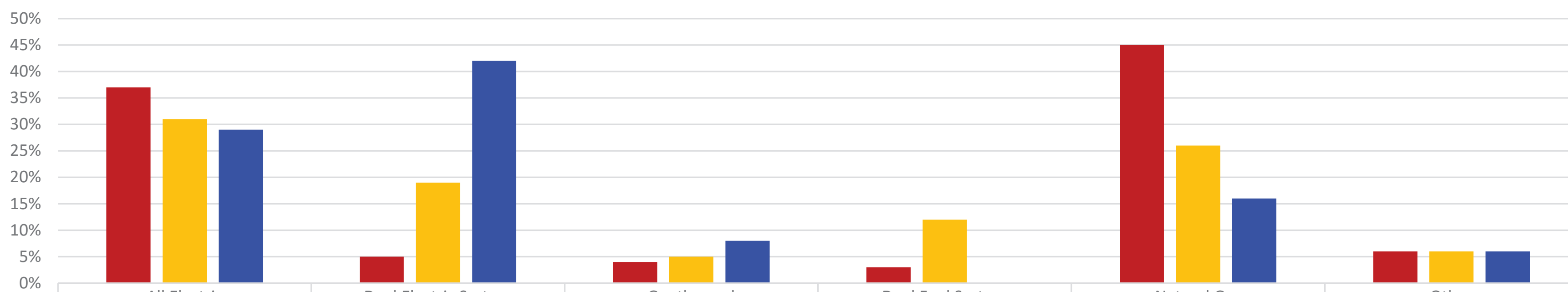
- **Medium Load Projection -** Customers are moving away from traditional gas space heating and reflects an increase in the adoption of alternative technologies such air source heat pumps and cold climate air source heat pumps

- **High Load Projection** - Customers are moving away from traditional gas space heating and reflects a greater increase in the adoption of alternative technologies such air source heat pumps and cold climate air source heat pumps

Projected fuel switching forecast by 2049/50

	Baseline Load Projection	Medium Load Projection	High Load Projection
MW	+150	+1,010	+4,320
GWh	+350	+2,980	+8,240
Millions of m^3	-40	-460	-1,080

Residential Space Heating Customer Shares (2049/50)



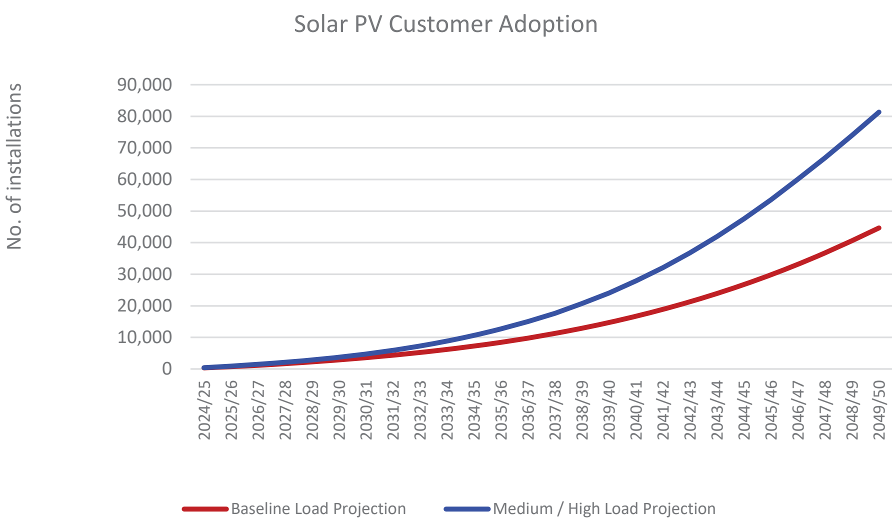
	All Electric	Dual Electric System	Geothermal	Dual Fuel System	Natural Gas	Other
Baseline Load Projection	37%	5%	4%	3%	45%	6%
Medium Load Projection	31%	19%	5%	12%	26%	6%
High Load Projection	29%	42%	8%	0%	16%	6%

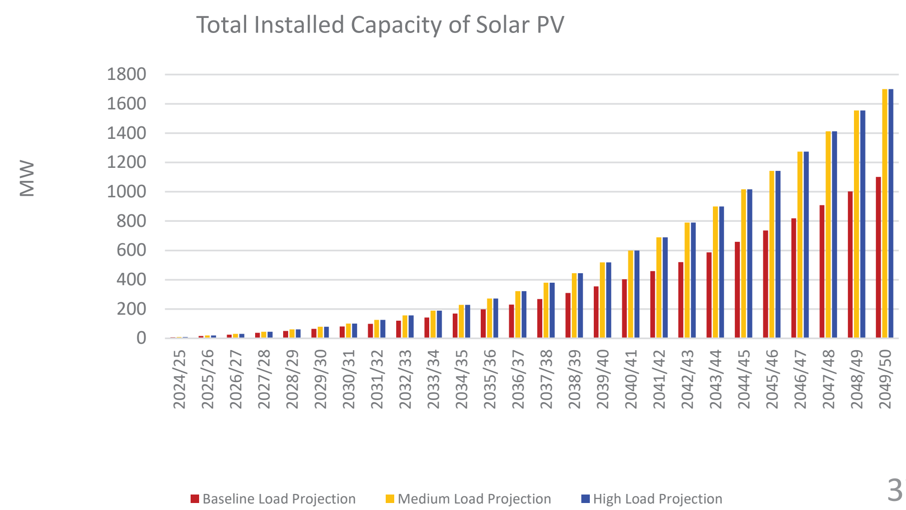
Customer Self-Generation & Storage

- **Baseline Load Projection -** Assumes all customer self-generation is through solar generation (i.e., Solar PV) with a low rate in customer adoption of Solar PV technology
- **Medium Load Projection -** Assumes all customer self-generation is through solar generation (i.e., Solar PV) and reflects moderate rate in customer adoption of Solar PV technology
- **High Load Projection –** Assumes all customer self-generation is through solar generation (i.e., Solar PV) and consistent with the adoption rates assumed in the medium load projection.

Projected forecast by 2049/50

	Baseline Load Projection	Medium / High Load Projection
No. of installations	44,655	81,319
Total installed capacity (MW)	1,100	1,700
Annual electrical energy (GWh)	1,280	1,980
Total consumed by the customer (GWh)	510	790
Total sold back to the grid (GWh)	770	1,190





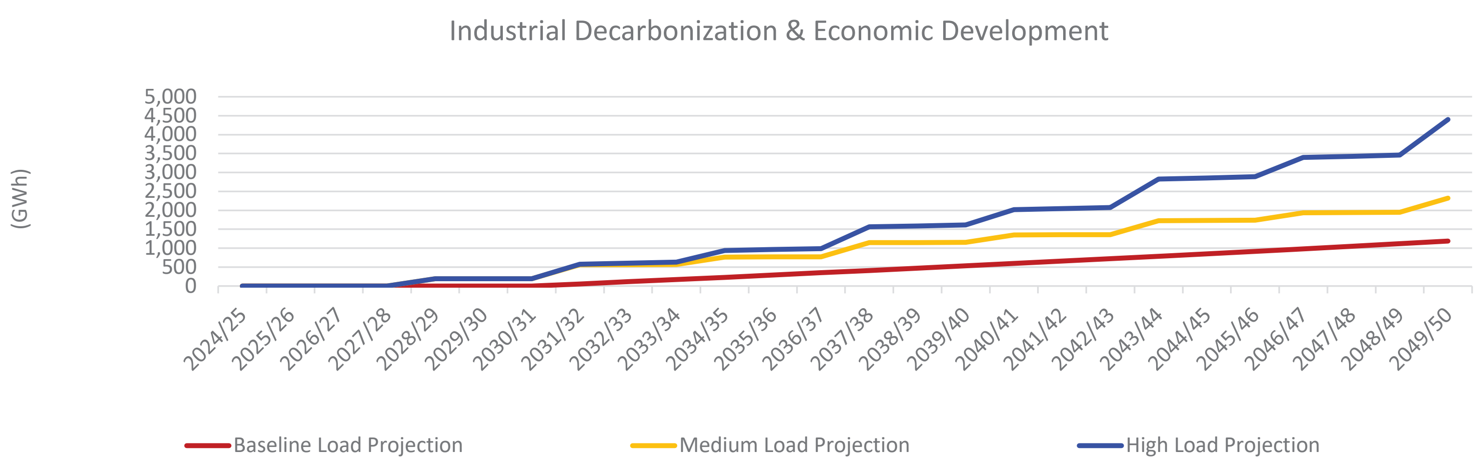
Industrial Decarbonization & Economic Development

- **Baseline Load Projection**
  - Long-term assumes existing Potential Large Industrial Load modeling approach
- **Medium Load Projection**
  - Decarbonization efforts by way of electrification every 6 years (50MW, 50MW, 50MW, 50MW) starting in 2028/29
  - Economic development efforts by way of electrification every 6 years (50MW, 50MW, 50MW, 50MW) starting in 2031/32
- **High Load Projection –**
  - Decarbonization efforts by way of electrification every 6 years (50MW, 75MW, 100MW, 125MW) starting in 2028/29
  - Economic development efforts by way of electrification every 6 years (50MW, 75MW, 100MW, 125MW) starting in 2031/32

Projected forecast by 2049/50

	Baseline Load Projection	Medium Load Projection	High Load Projection
MW	+160	+370	+690
GWh	+1,190	+2,320	+4,400
Millions of m^3 *	0	-70	-130

* Note: Reflects reduction in natural gas consumption as customers decarbonize through electrification of processes



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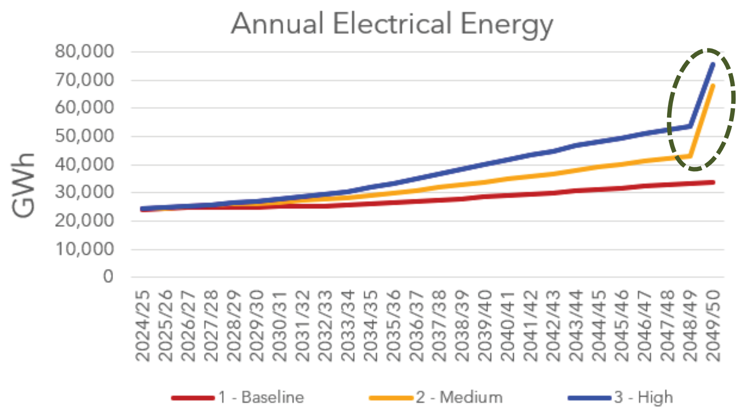
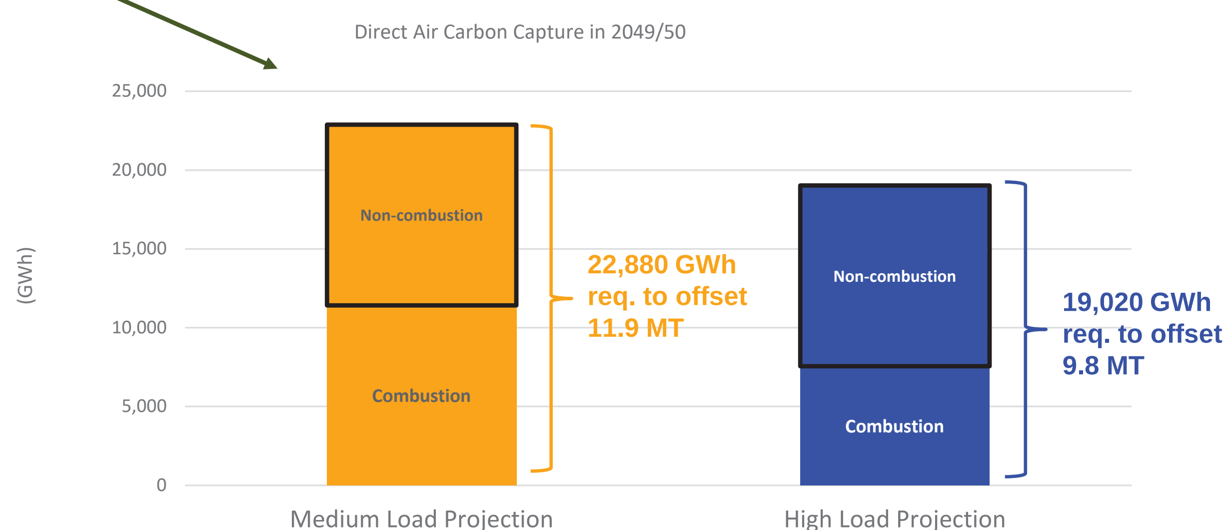
Direct Air CO_2 Capture

The Medium and High load projections meet the objective of achieving net-zero economy by 2050 through negative emission technologies.



Projected forecast by 2049/50

	Baseline Load Projection	Medium Load Projection	High Load Projection
GWh	0	+22,880	+19,020
Installed Capacity (MW)	0	+3,900	+3,250
Peak Demand (MW)	0	+780	+730



We are looking for your feedback:

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- **Key Planning Assumptions – 5 Breakout Discussions:**
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Explore key planning assumptions at each station:

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- **Are there other factors we should be considering for [key planning assumption]?**

Are there other planning assumptions you would like to provide feedback on?

How breakout discussions will work:

- Each station will have a facilitator and subject matter expert to support discussion.
- 30 minutes total – Feel free to move around the stations.
- Dinger every five minutes – to mentally signal opportunity to shift
- Share back at end - Facilitators/group members

INFORM

Resource Options Inventory & Proposed Strategies

Discussion Objectives

Our goal is to share information about our resource options inventory and proposed resource options strategies.

This information provides the foundation for future discussion on the modelling and analysis of the 2025 IRP, including scenarios and sensitivities.

Resource Options Inventory Introduction

Manitoba Hydro monitors and maintains an inventory of resource options that have the potential to meet Manitoba's future electricity needs.

This inventory consists of a range of different technologies including:

- Utility scale generation,
- Enhancements to existing generating stations,
- Distributed generation, and
- Energy efficiency (demand side management) measures.

Each of these resource options is considered and evaluated in the planning process based on their technical and economic characteristics.

The Range of Resource Options

The inventory is developed from a range of different information sources including:

- Publicly available reports
- Internal reports
- Consultant reports

The resources are at a range of different stages of planning and technological maturity

The resource inventory reflects a diversity of:

- Fuel types
- Dispatchability
- Technological maturity
- Costs
- Greenhouse gas (GHG) emissions

Planning is a continually evolving process with improvements or the addition of new resource options regularly made over time. Manitoba Hydro continuously monitors the state of developing technologies for readiness, including new resources in our models when there is sufficient information and confidence levels available for the technology.

Resource Options Inventory

Dispatchable & Mature | Intermittent & Mature | Dispatchable & Emerging

All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in service.**

This list shows all potential resource options available; however, some may not be available under specific Resource Options Strategies.

Selectable Energy Efficiency and Demand Response

Selectable Energy Efficiency

- Selectable energy efficiency is additional energy efficiency programming **above and beyond what is included in the Efficiency Manitoba plan**.
- Integrated resource planning evaluates selectable energy efficiency options on a **level playing field with generation resources**.
- Selectable energy efficiency options **reduce energy consumption**. If that energy reduction coincides with Manitoba's peak demand, then it can also **reduce the required capacity**.

Demand Response

- **Demand response** options (direct load control, curtailable load, etc.) will also be evaluated as a resource to reduce peak demand.

Resource Options Have Different Characteristics

Characteristics captured in our modelling include:

- **Installed Capacity**
- **Firm Capacity**
- Operating Parameters
- **Dependable Energy**
- Development Timelines
- **Economic Life**
- Capital Costs
- Transmission Costs
- Fixed Operating Costs
- Variable Operating Costs
- Fuel Costs
- GHG Emissions

Characteristics define how each resource can operate within the energy supply system.

Resource Options Have Different Characteristics

100 MW of a new resource will bring different value to the electrical system, depending on the resource.

	Wind	Solar	Hydro	Natural Gas Combustion Turbine
Installed Capacity (MW)	100	100	100	100
Winter Firm Capacity (MW)	20	0	90	100
Annual Dependable Energy (GWh)	381	188	830	720
Economic Life (years)	30	25	72	30

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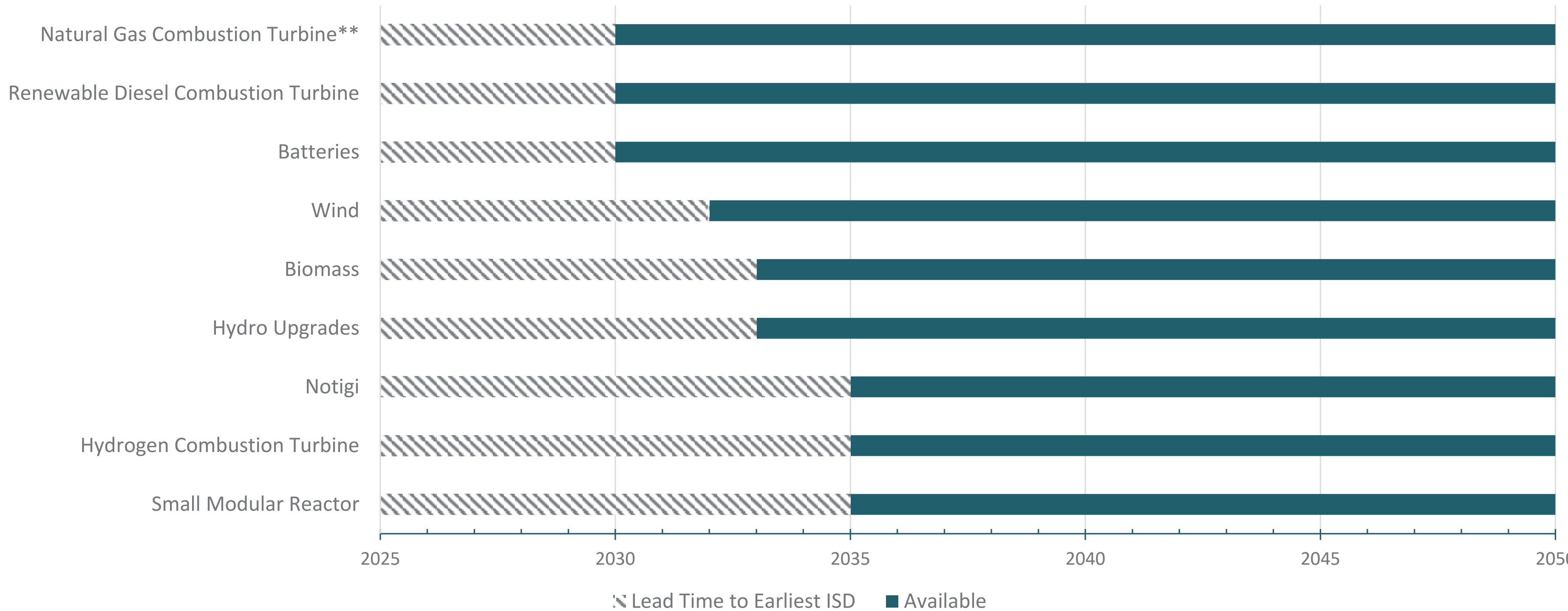
Examples of Earliest In Service Dates (ISD)

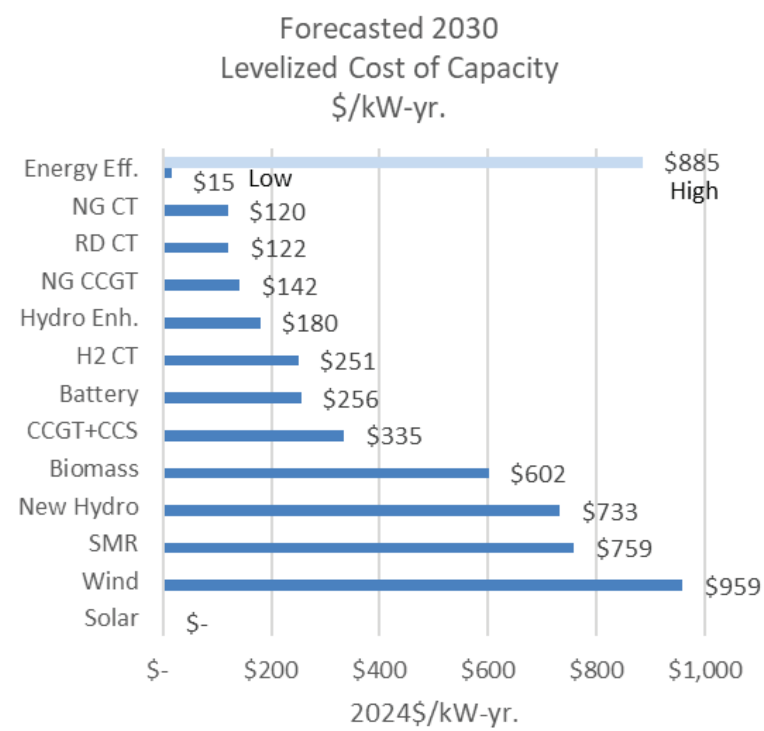
These are examples of earliest ISDs that will be assumed in the 2025 IRP, based on the best information currently available*. As planning progresses and technologies mature, earliest ISDs may adjust.



*The earliest in-service dates listed represent only a subset of resource options.
**Actual in-service dates for specific Natural Gas Combustion Turbines technologies may vary.

Economic Competitiveness of Resource Options

Levelized costs represent the estimated cost of producing energy and capacity but **are not indications of the overall value of a resource to the system.**



Proposed Resource Options Strategies

Four proposed strategies and their assumptions

Resource Options Strategies		Assumptions
A	Technology Neutral	Compliant with federal Clean Electricity Regulations.
B	Net-Zero Grid 2035	Strategy A, plus requirement that electricity grid is net-zero by 2035.
C	Near Term Wind Generation Projects	Strategy B, plus up to 600 MW of Indigenous majority owned wind with dispatchable resources for reliability.
D	No Fuel-Based Resources	Strategy B, plus requirement of no fuel-based combustion turbines post 2035 (i.e., no natural gas, hydrogen, biofuel, or biomass generation).

Resources Included Under Each Strategy

Resource Type	RESOURCE OPTIONS STRATEGY				
	A. Technology Neutral	B. Net-Zero Grid 2035	C. Near-Term Wind Generation Projects	D. No Fuel-Based Resources	
				Pre 2035	Post 2035
New Hydropower	✓	✓	✓	✓	✓
Upgrade Existing Hydropower	✓	✓	✓	✓	✓
Wind	✓	✓	✓	✓	✓
Solar	✓	✓	✓	✓	✓
Energy Efficiency	To be evaluated through sensitivities				
Batteries	✓	✓	✓	✓	✓
Natural Gas Fueled CT	✓	✓	✓	✓	✗
Natural Gas Fueled CT with Carbon Capture	✓	✓	✓	✓	✗
Renewable Diesel Fueled CT	✓	✓	✓	✓	✗
Biomass Fueled Steam Turbine with Carbon Capture	✓	✓	✓	✓	✗
Biomass Fueled Steam Turbine without Carbon Capture	✓	✓	✓	✓	✗
Hydrogen Fueled CT	✓	✓	✓	✓	✗
Market Purchases (Capacity Imports)	✓	✓	✓	✓	✓
Small Modular Reactors	✓	✓	✓	✓	✓

Next Steps

Next Steps: shaping our energy future together

What's next?

Dec 2 - TAC meeting 3 – Modelling, analysis, and evaluation

Let's talk about the future

Complete our survey by December 18, 2024: hydro.mb.ca/future
Questions or comments? Email us at: IRP@hydro.mb.ca

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Technical Advisory Committee

Fall 2024 – Meeting 3

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

Land acknowledgment

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, Cree, Anishininew, Dakota, and Dene peoples and the homeland of the Red River Métis.

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.

Agenda

Purpose:
Share our modeling & analysis approach and get your feedback on evaluation metrics.

Topics

1. Updates from TAC Meeting #2
2. Modelling & Analysis
3. Evaluation
   - A Balanced Recommendation
   - Value Themes
   - Metrics
   - Method
4. Next Steps

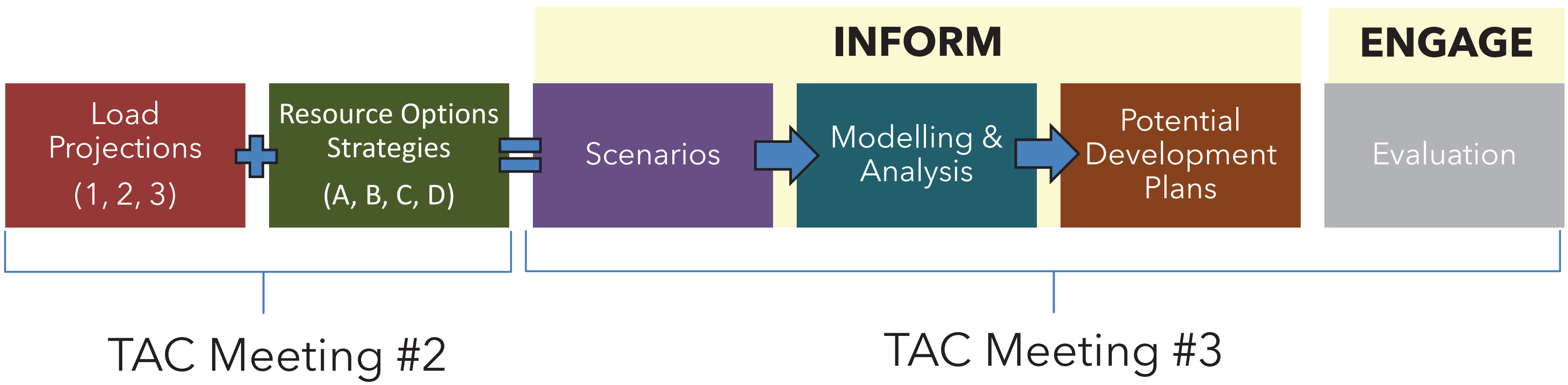
A Note About Information Included in this Document

All information included in this document is presented as proposed, draft, and/or preliminary. Discussion and feedback is welcomed to inform finalized versions of this information.

Manitoba Hydro is committed to continuing to ensure transparency of our energy planning process. This includes engaging with customers and interested parties in the development of the IRP, so it is informed by feedback heard.

Finalized key inputs, scenarios, and evaluation metrics will be communicated after the planned engagement concludes, including how feedback was incorporated.

Continuing the Conversation



Updates from TAC Meeting #2

Resource Options Inventory

Dispatchable & Mature

Intermittent & Mature

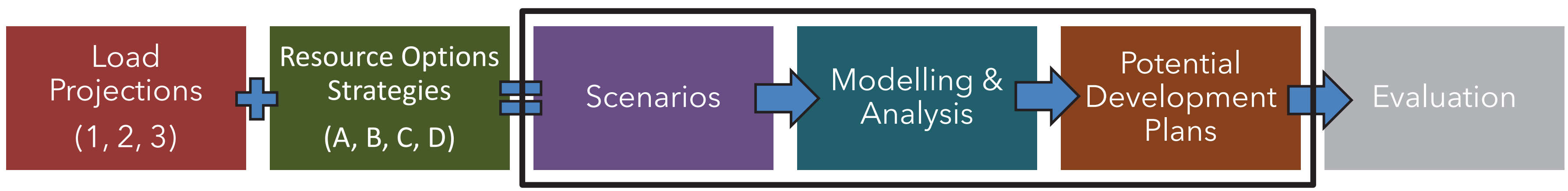
Dispatchable & Emerging

All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in service.**

This list shows all potential resource options available, however, some may not be available under specific Resource Options Strategies.

INFORM

Modelling & Analysis Approach



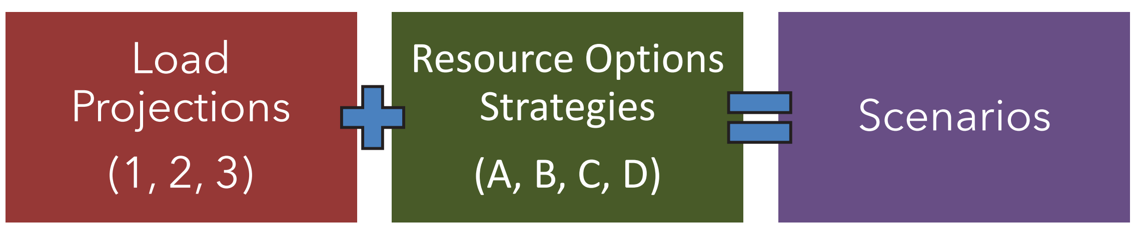
Objectives of our Discussion

Our goal is to share information about the modelling and analysis approach for the 2025 IRP. Discussion will focus on the following:

- The modelling and analysis process
- How scenarios and sensitivities are defined
- Summarizing current sensitivities that have been identified and their prioritization

Scenarios

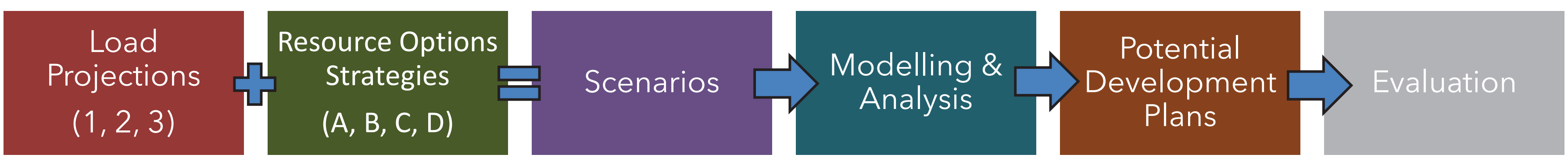
- Scenarios are a likely combination of a Load Projection and Resource Options Strategy.
- Scenarios represent the energy futures.
- Aiming to have a group of scenarios that together, represent a reasonable range of what the energy future might look like in Manitoba.



Modelling and Analysis Approach

Potential development plans

- In the modelling and analysis, scenarios produce potential development plans.
- A development plan outlines the required steps to meet future energy needs.
  - It may include building new energy sources, infrastructure or programs to manage energy use during peak demand.

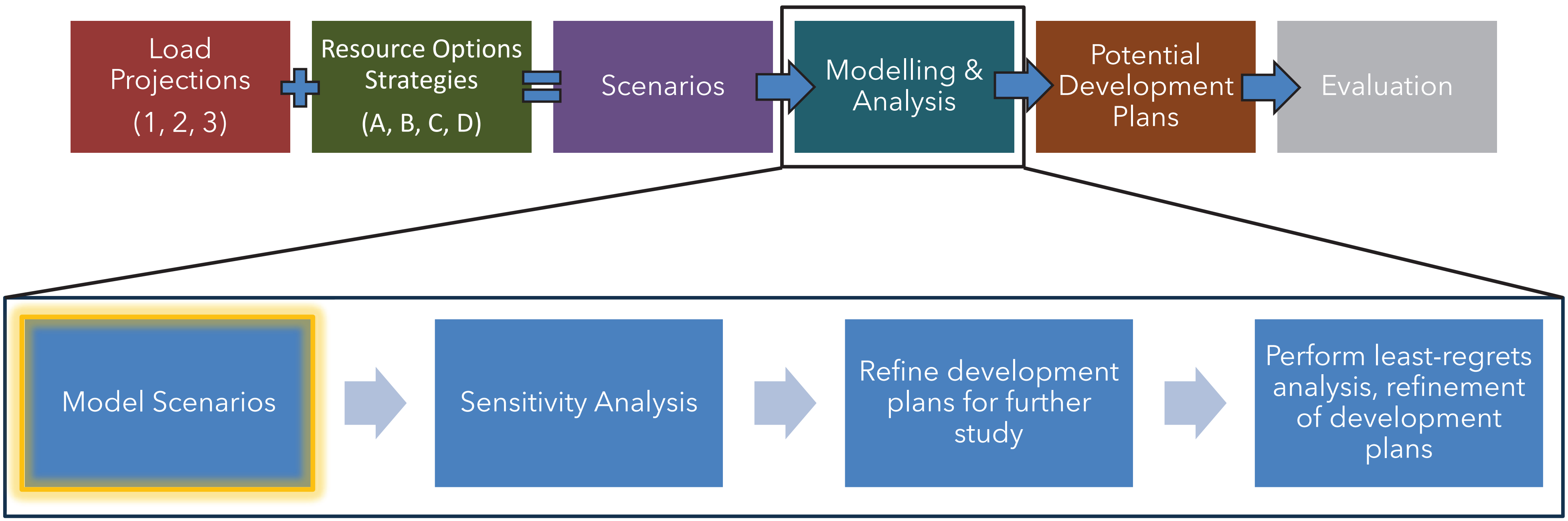


Sensitivity Analysis

- Sensitivity analysis, or what-if analysis, helps us to understand how individual inputs or assumptions can change a development plan.
- Scenarios are the starting points for sensitivities.

Modelling & Analysis Process

Outlining the steps to identify potential development plans



Bringing Together Key Inputs to Define Scenarios

Eight proposed scenarios represent different energy futures

Resource Options Strategies	Load Projections		
	1 - Baseline	2 - Medium	3 - High
A - Technology Neutral	S1A	-	-
B - Net-Zero Grid 2035	S1B	S2B	S3B
C - Near Term Wind Generation Projects	S1C	S2C	S3C
D - No Fuel-Based Resources	-	-	S3D

S = Scenario
Scenarios range from **1A to 3D**, where the number represents a **Load Projection** and the letter represents the **Resource Options Strategy**.

Only likely combinations of load projections and resource options strategies will be studied.

- Those proposed not to be studied are noted by (-).

Bringing Together Key Inputs to Define Scenarios

Eight proposed scenarios represent different energy futures

Resource Options Strategies	Load Projections		
	1 - Baseline	**2 - Medium**	**3 - High**
A - Technology Neutral	S1A	-	-
B - Net-Zero Grid 2035	S1B	S2B	S3B
C - Near Term Wind Generation Projects	S1C	S2C	S3C
D - No Fuel-Based Resources	-	-	S3D

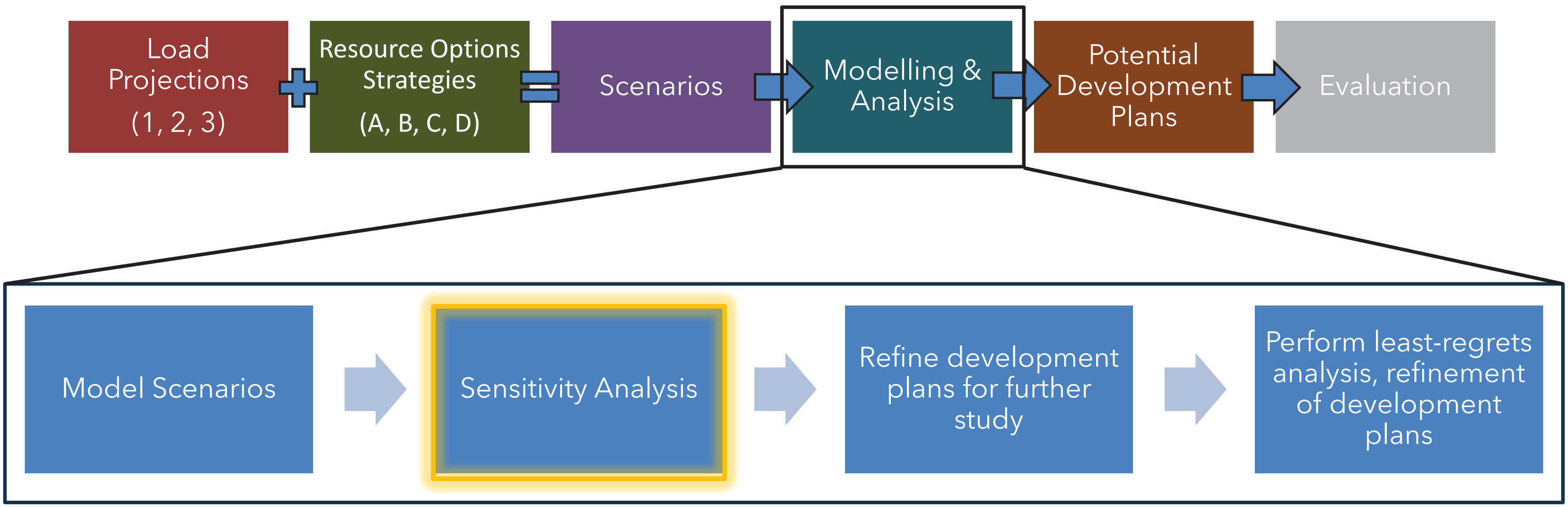
S = Scenario
Scenarios range from **1A to 3D**, where the number represents a **Load Projection** and the letter represents the **Resource Options Strategy**.

Only likely combinations of load projections and resource options strategies will be studied.

- Those proposed not to be studied are noted by (-).

Modelling & Analysis Process

Outlining the steps to identify potential development plans



Proposed Sensitivities

1st Priority Sensitivities	
High Market Prices	Test the influence of market prices on resource selections.
Low Market Prices	
Capital Costs	Test the influence of high capital costs on resource selections.
In Service Date (ISD) Changes	Test how delaying the availability of resources influences a development plan.
Direct Air CO_2 Capture (DAC)	Test if the load increase due to the inclusion of DAC for reducing non-combustion emissions impacts the development plan.
Selectable Energy Efficiency	Test the value of seeking energy efficiency beyond the levels in Efficiency Manitoba's DSM Plan extended to 2050.
Adjust assumptions in Resource Options Strategy D (No-Fuel Based Generation)	Test the impacts of not including hydrogen combustion turbines and biomass generation in Resource Option Strategy D.

Not all sensitivities will be applied to all scenarios.

Prioritization will vary based on the Scenario **and will evolve as modelling results become available.**

Proposed Sensitivities

2nd Priority Sensitivities	
Demand Response	Test the value of demand response to the Manitoba Hydro systems.
New Hydrogeneration (Any Project)	Test which hydrogeneration resource option(s) we would build, if we were required to build at least one new hydrogeneration resource.
Hydro Upgrade Projects	Understand potential value of hydrogeneration upgrade projects by requiring their selection.

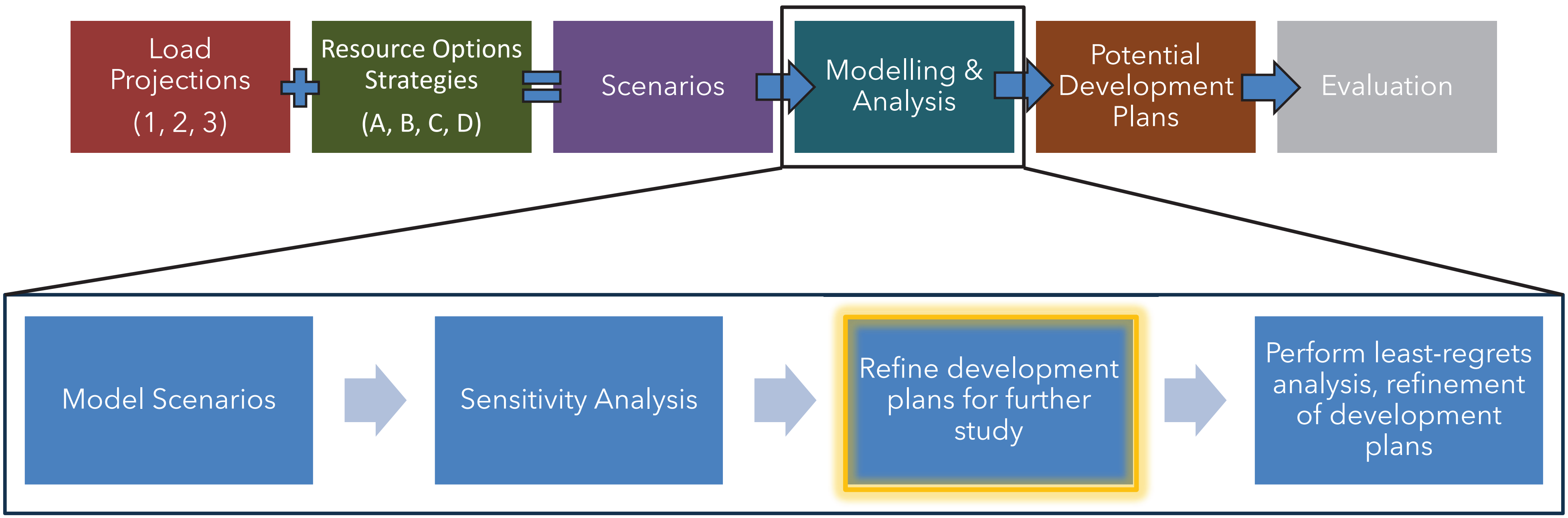
3rd Priority Sensitivities	
No New Hydrogeneration	Test the value of hydrogeneration resources.
Continued Use of Existing Fuel-Based Resources	Test the importance of continued use of existing fuel-based resources when new fuel-based resources are restricted.
Hourly Price Profiles	Test if resource selections sensitive to market prices are further influenced by hourly market price profiles.

Not all sensitivities will be applied to all scenarios.

Prioritization will vary based on the Scenario **and will evolve as modelling results become available.**

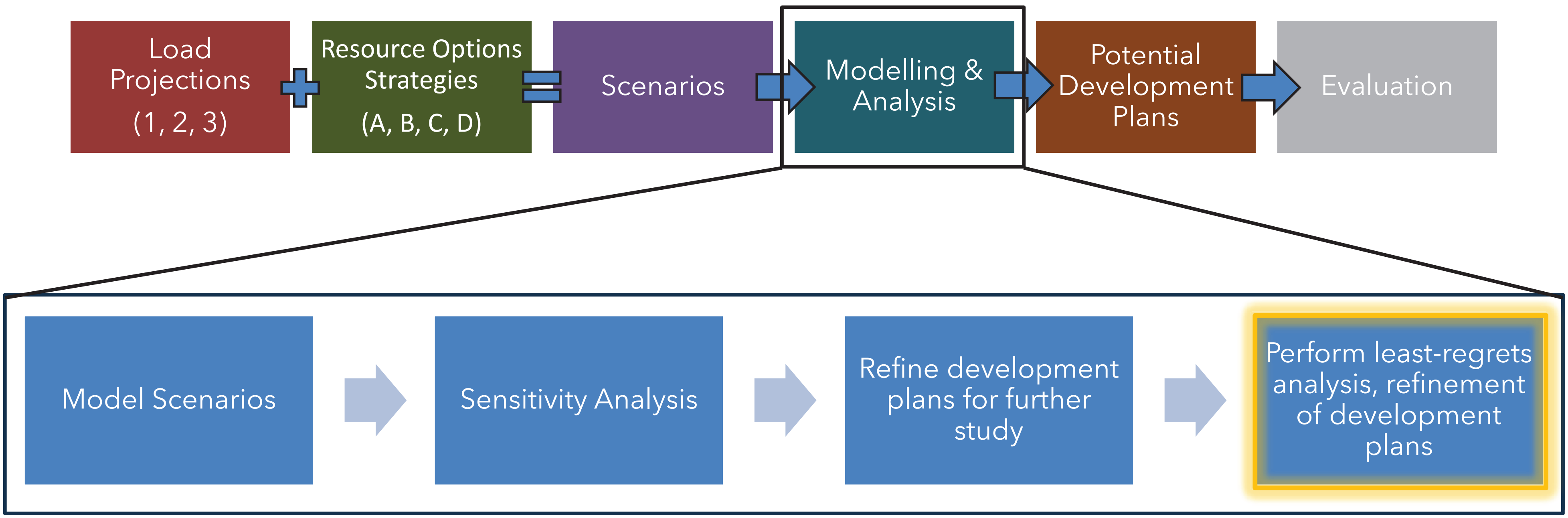
Modelling & Analysis Process

Outlining the steps to identify potential development plans



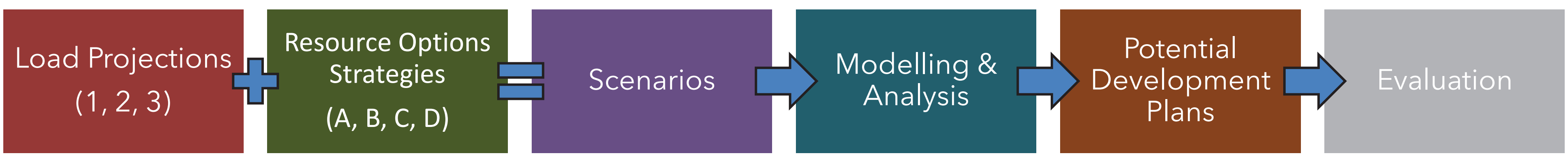
Modelling & Analysis Process

Outlining the steps to identify potential development plans



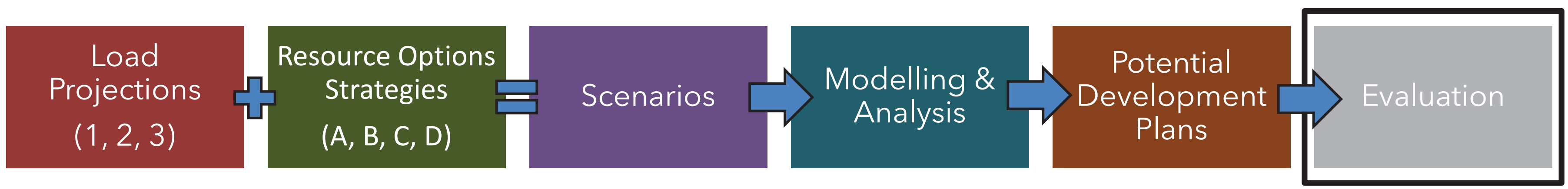
Next Steps Towards Evaluation

- Approximately 50+ scenarios and sensitivities will be analyzed.
- Result will be a series of potential development plans for evaluation.
- Evaluation includes applying evaluation metrics to these potential development plans.

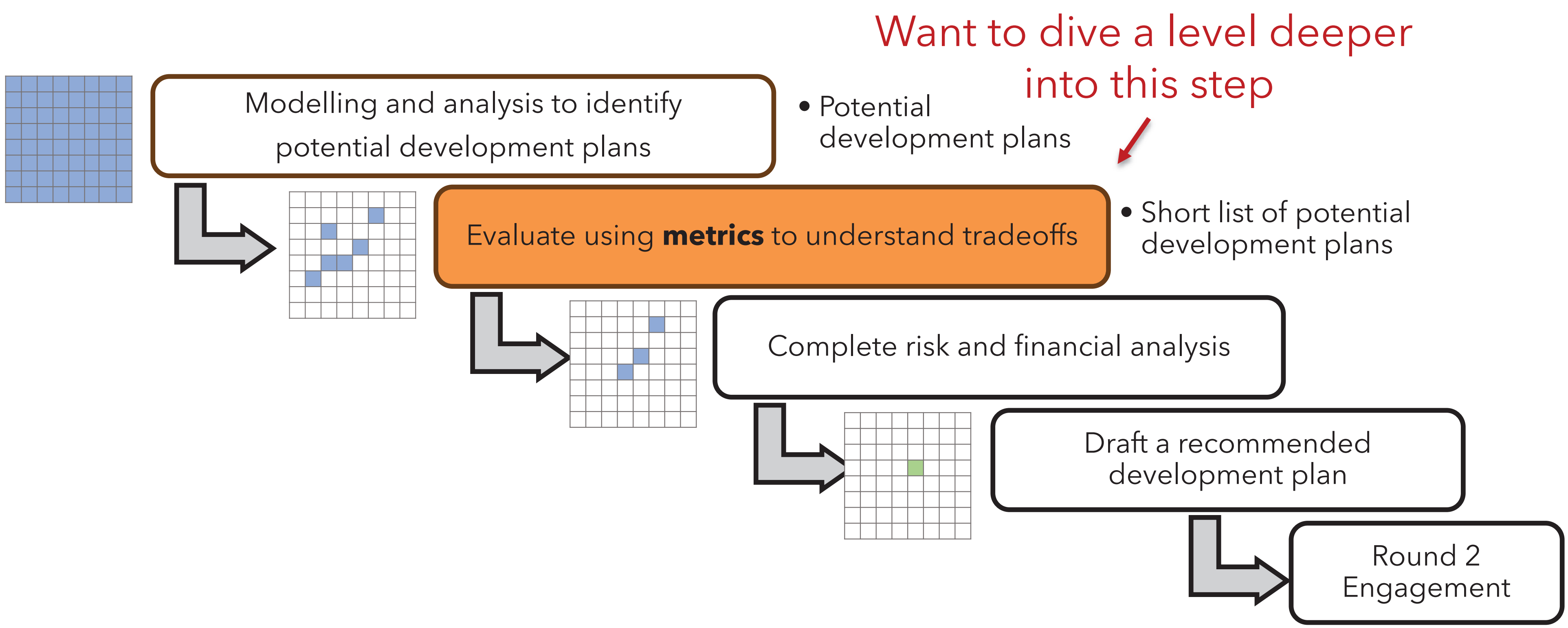


ENGAGE

Evaluation



Modelling, Analysis and Evaluation



The Goal: A Balanced Recommendation

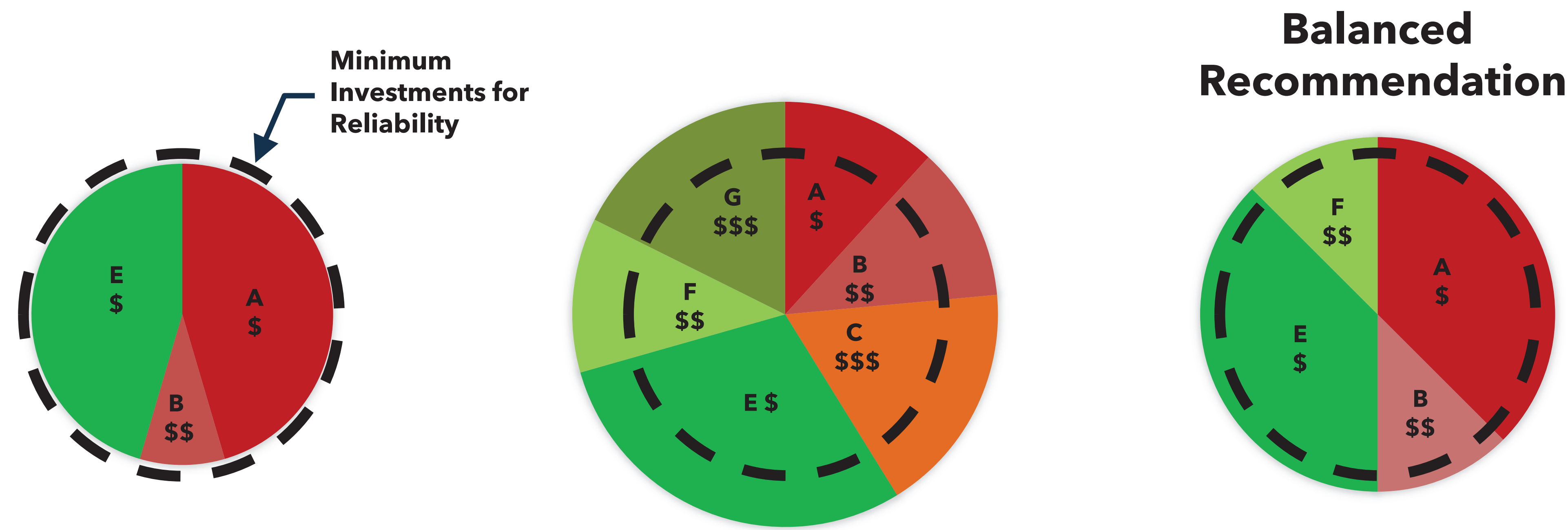
Why? We know we need to go beyond traditional decision making based on utility lowest-cost and meeting minimum reliability needs.

How will we do this? By applying the evaluation metrics and understanding of the relative importance of evaluation value themes.

The result? A balanced recommendation for a development plan that:

- meets foundational reliability requirements,
- addresses policy and mandates,
- is robust to changes in the energy landscape, and
- reflects what is important to Manitobans.

A Balanced Recommendation



$$
Minimum Supply for
Reliability at Least Cost

$$$$$
Excess Surplus,
Costly, Less Effective Options

$$$
Robust to Uncertainty,
Resources with Valued Attributes
Cost Effective

Summary: A Balanced Recommendation

- The recommended development plan will be **determined by more than lowest-cost analysis** and planning criteria.
- A balanced recommendation is intended to **reflect Manitobans' energy needs and priorities**.
- Value themes and metrics will be used to **assess tradeoffs**, and **no single plan will yield the best results** in every metric.
- This is a **new step in the process** – we expect that evaluation metrics, the relative importance of value themes, and the evaluation method will continue to evolve with future IRPs.

Evaluation Value Themes

We Are Looking For Your Feedback

Understanding the relative importance of each value theme:

- How important each value theme is when compared to the others.

Shaping the metrics:

- If there are other themes or metrics we should be considering.
- Describing and characterizing the metrics results using a range you can relate to (i.e., example: favourable vs. less favourable?)

Proposed Evaluation Value Themes

Four themes that reflect what we're hearing and learning is important to Manitobans

Reliability

Costs

Environmental

Social

Evaluation Metrics

Proposed Evaluation Metrics

Reliability

Adequate Supply

Resource Diversity

Technology Maturity

Costs

Net System Costs

Customer Direct Costs

Environmental

GHG Emissions

Environmental Considerations

Social

Economic Reconciliation

Socio-Economic Benefits

Note: highlighted metrics are new for the 2025 IRP

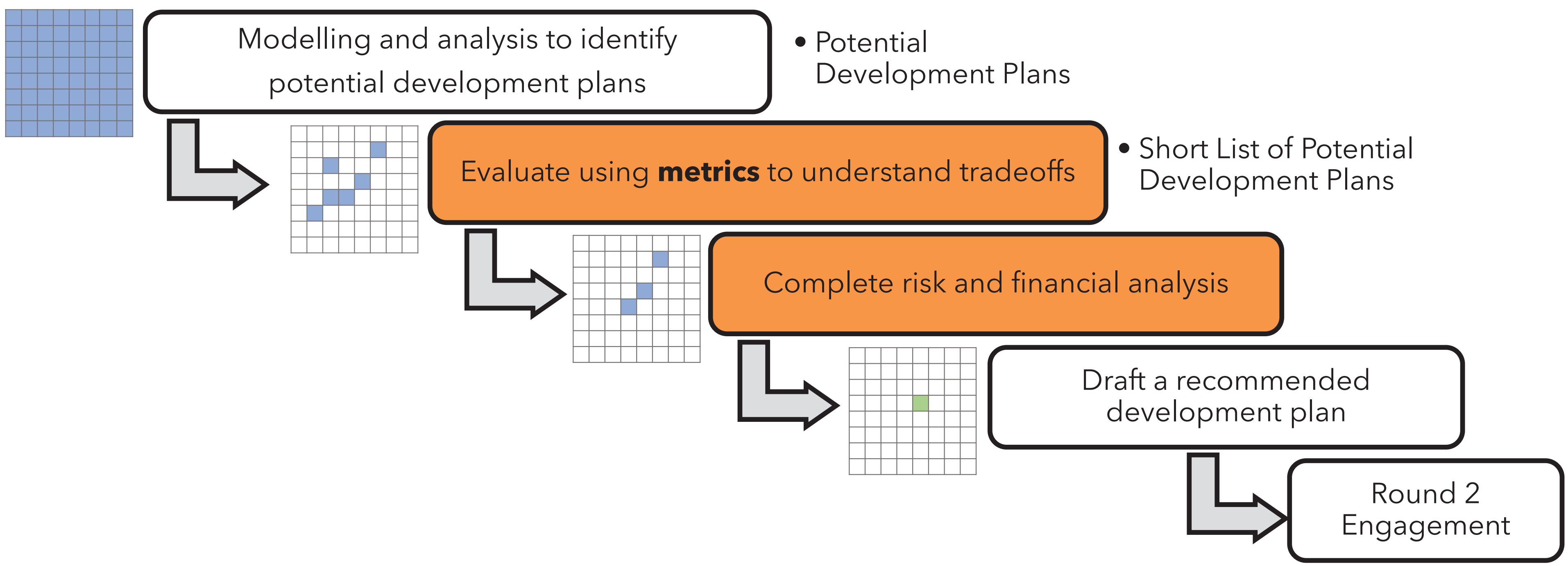
Evaluation Metric Framework

Value Theme	Evaluation Metric	Description	Range

Evaluation

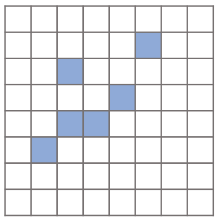
Modelling, Analysis and Evaluation

Evaluation method, risk and financial analysis



Evaluation Method

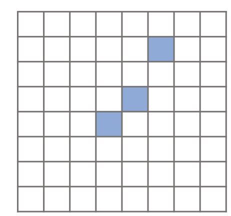
Less Favourable	Neutral	More Favourable



Potential development plans from modelling & analysis

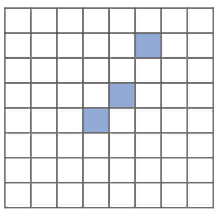
Plan	Reliability	Costs	Environment	Social	
A					✓
B					✗
C					✗
D					✓
E					✗
F					✓

Short list of potential development plans proceed to risk & financial analysis



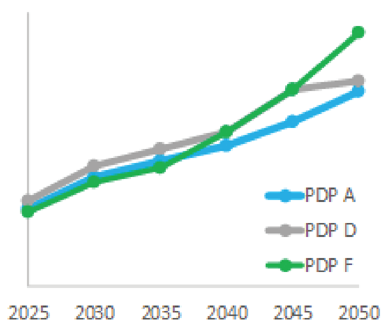
Risk and Financial Analysis

Short list of potential development plans from evaluation



Risk Assessment

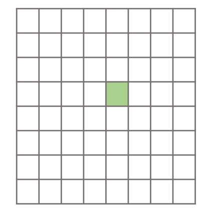
Financial Analysis/ Rates



Financial and Risk Mitigation Required

- Actions and adjustments ("nudges" to plans) based on financial analysis and risk assessment/ mitigations
- Plans adjusted without reducing value

Balanced recommendation on development plan to be shared in round 2 engagement (Spring 2025)



Next Steps

Next Steps: Shaping Our Energy Future Together

What's next?

Finalized key inputs, scenarios, evaluation metrics

Spring 2025

Let's talk about the future

Complete our survey by December 19, 2024: hydro.mb.ca/future
Questions or comments? Email us at: IRP@hydro.mb.ca

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Technical Advisory Committee
Winter 2025 – Meeting 4

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

Land acknowledgment

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.

Objectives of the Session

Feedback was shared that there was interest in better understanding key concepts of energy planning at Manitoba Hydro and how that relates to resource options.

This session was added to:

- Share high level information on what Manitoba Hydro considers when it conducts energy planning.
- Continue discussion on resource options and their characteristics
- Provide an opportunity for further discussion with participating TAC members

Agenda

Purpose:
Cover key energy planning concepts and revisit resource options for further discussion

Topics

1. The 2025 IRP & Integrated Resource Planning
2. Key Concepts in Energy Planning
3. Resource Options

Introductions

Questions Received

Resource Options you would like to hear more about:

1. More discussion of roof top wind for residential/commercial applications as an efficiency/generation asset.
2. Treatment of Energy Efficiency as a Resource Option, Load Scenarios created for the IRP process.
3. The projected energy storage options over the next 5 - 10 -20 years.

Additional questions for discussion:

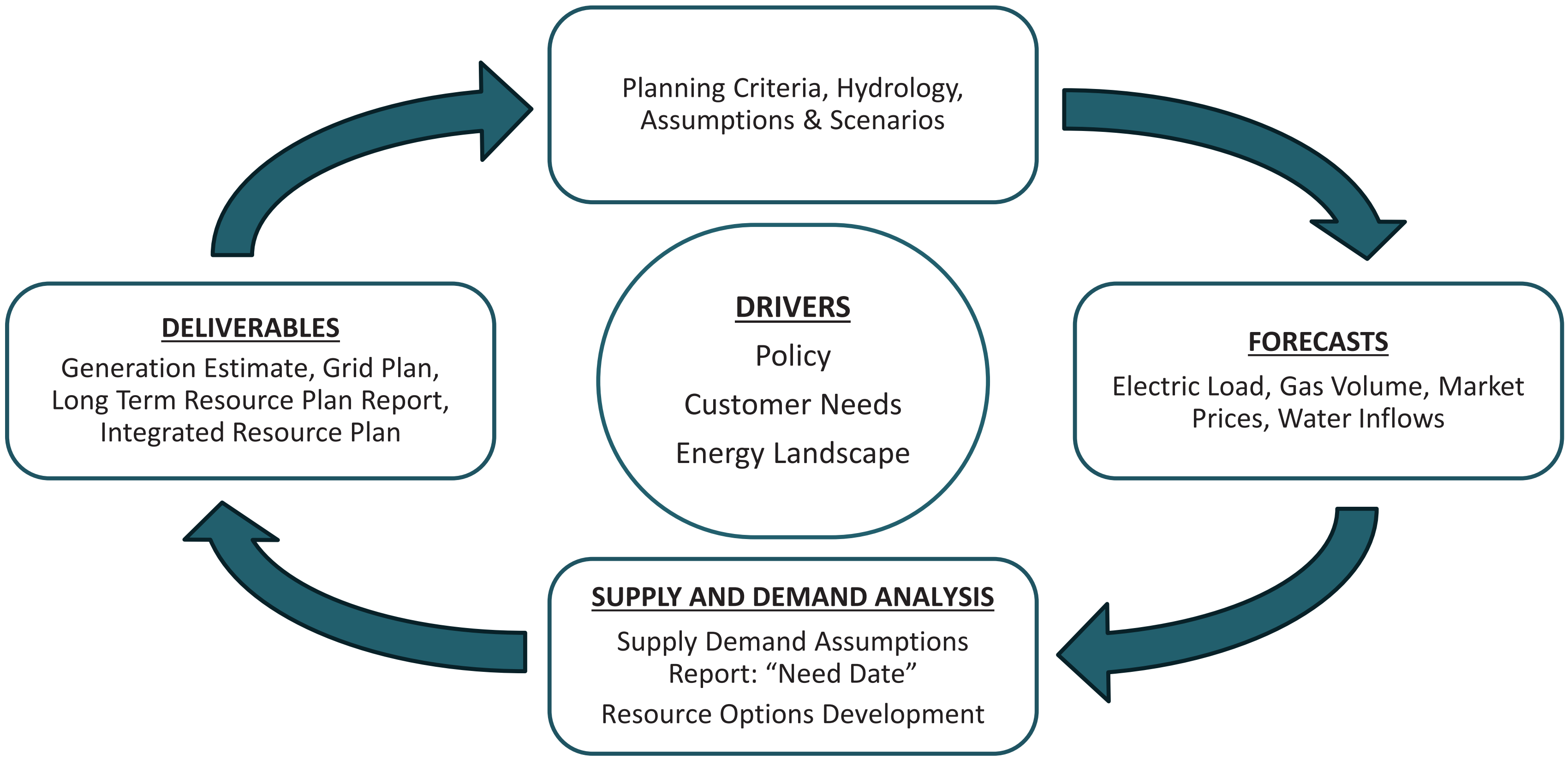
4. At first glance, self-generation options have the ability to expand generation quickly and allow MB Hydro to defer capital expenditures on system upgrades or new generation. Can the IRP team expand further on these opportunities and detail the challenges of smaller, dispersed generation assets within the electric system? Are there any roadblocks outside of MB Hydro that may prohibit this expansion?
5. How is Artificial Intelligence (AI) anticipated to impact the projections? I understand the use of AI can require a significant energy demand. Also, how might AI create efficiencies in our energy usage?
6. Has any consideration been given to what effect tariffs on energy exports might have on the IRP decisions?

The 2025 IRP & Integrated Resource Planning

What is an Integrated Resource Plan (IRP)?

- **A process utilities use to understand and plan for future energy needs.**
- For Manitoba Hydro, it accounts for both our electricity and natural gas systems and reflects combinations of customer needs, service territory, the energy products offered to customers, existing assets, and policy drivers.
- A key part of an IRP is that it **includes engagement** with customers and interested parties as part of its development to ensure openness and transparency in the energy planning process.
- Developing an IRP is a **repeatable process** that can be updated as future conditions evolve.

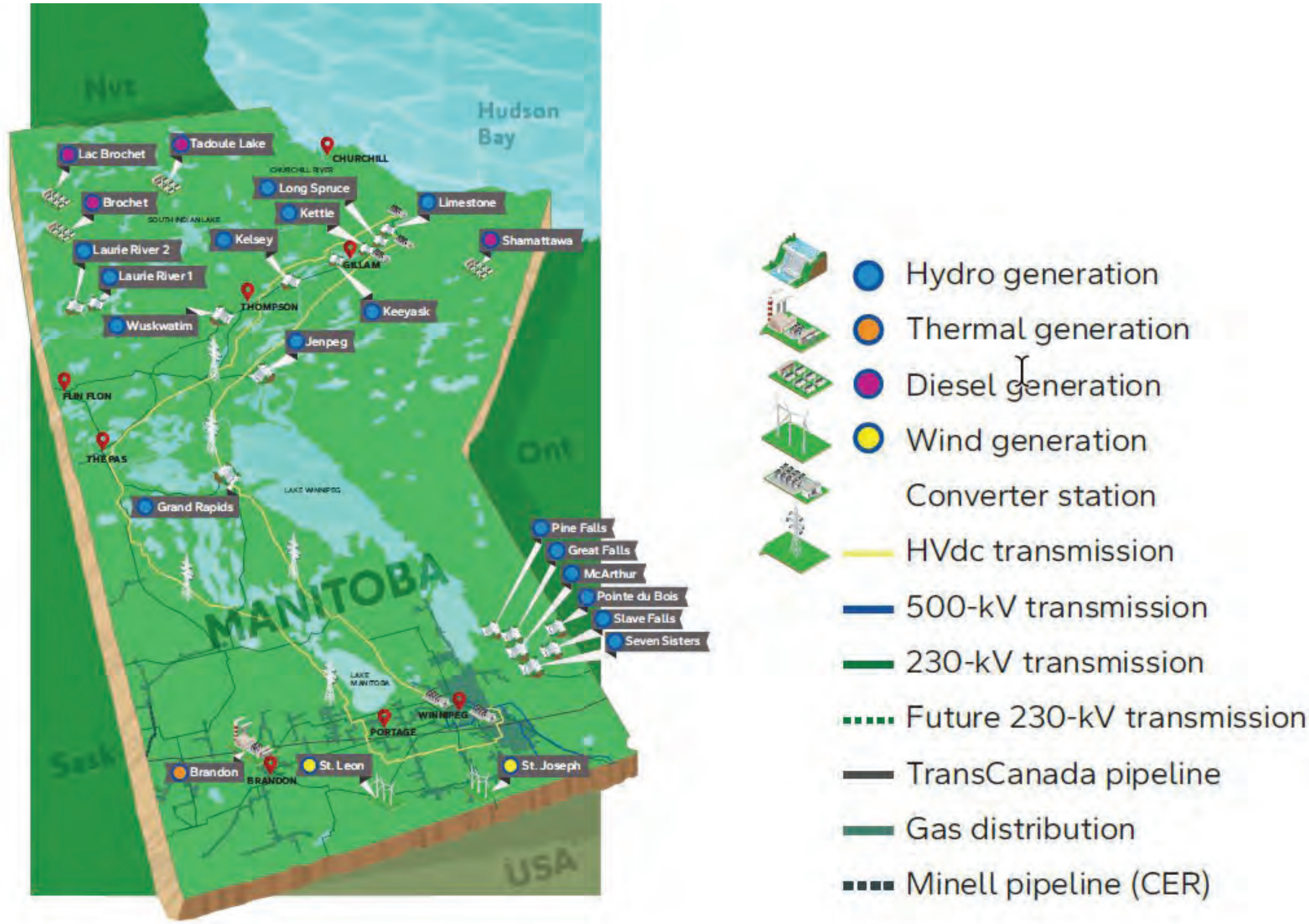
Integrated Resource Plan is part of the ongoing planning cycle at Manitoba Hydro



Key Concepts in Energy Planning

2023 IRP Appendix 1 - Existing System and Load
https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-a1-existing-system-and-load.pdf

Major Facilities



Terminology: Capacity, Energy and Peak Demand

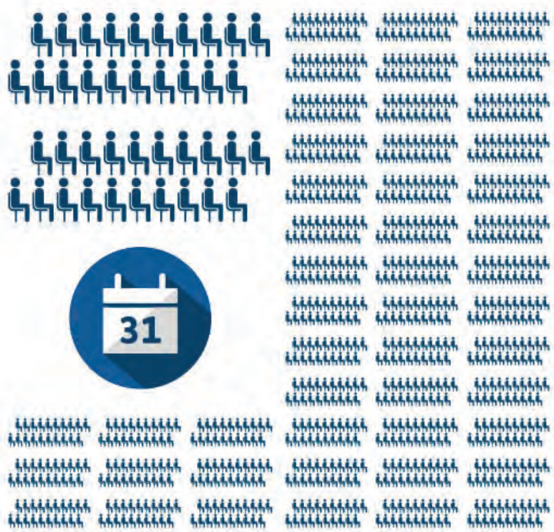
Capacity

Maximum generator output (MW)

5 buses with 20 seats = 100 riders

Energy

Electricity produced in time period (MWh)



Riders per day: 1,000 riders

Peak demand

Greatest hourly electricity use (MW)

Peak ridership: 75 in morning rush hour

Reliability: Planning Criteria

Planning criteria are consistent with industry best practices

Energy Planning Criteria

- Plan to have sufficient energy to meet firm demand during worst drought on record (Dependable Energy)
- Consistent with many other major hydroelectric utilities

Capacity Planning Criteria

- Capacity supply must exceed Manitoba peak load + export obligations + Planning Reserve Margin (PRM)
- Consistent with North American Electricity Reliability Corporation (NERC)

Gas System Planning Criteria

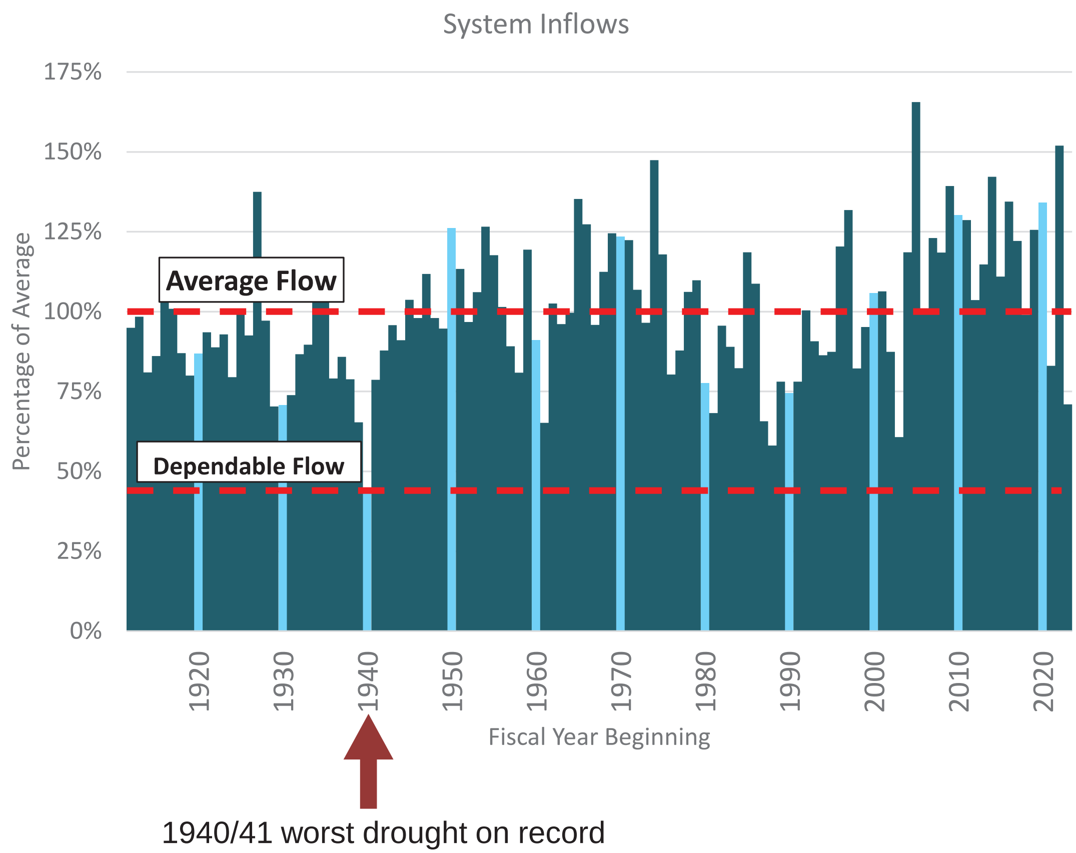
- Gas distribution systems are planned to deliver firm customer demand on a “design day” (a coldest day) while maintaining adequate pressure for reliable service
- Consistent with many other gas distribution utilities operating in cold climates

Transmission Planning Criteria

- Defines technical requirements for interconnecting generator or customer load facilities
- Consistent with North American Electricity Reliability Corporation (NERC) standards

Water Flows Drive Hydro Generation and Energy Planning

- **Water flows can vary significantly year-to-year**
- Hydroelectric generation depends primarily on water supply
  - Generation in a flood year is approximately 2 times that of the worst drought year
- Manitoba Hydro plans to **supply both Manitoba demand and dependable exports** under all flow conditions, **including worst drought on record**



Manitoba Hydro’s Interconnections Provide Reliability and Enable Economic Operations

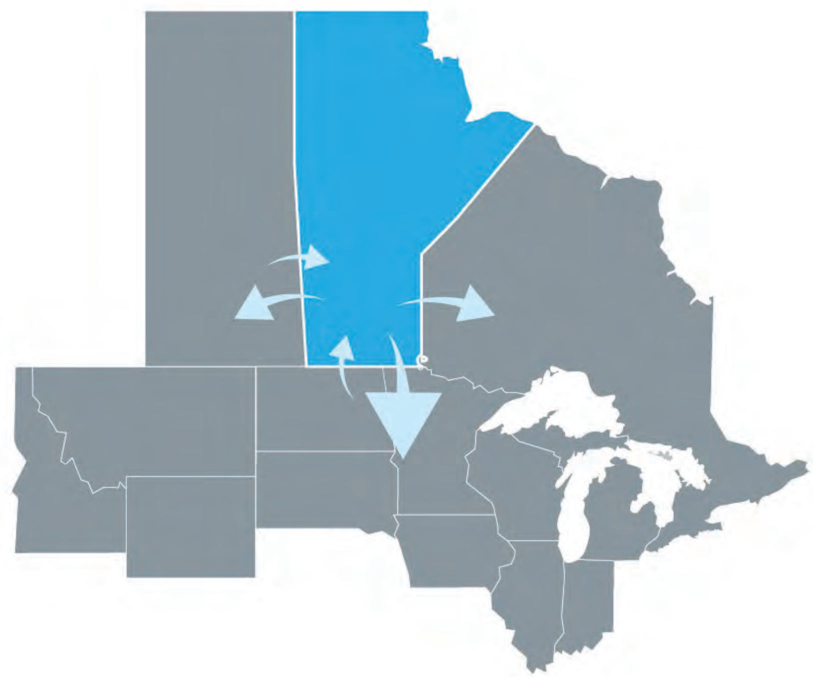
Interconnections facilitate imports and exports of electricity, **enhancing reliability for Manitoban’s and allowing for sale of excess electricity.**

- Provides diversity of **supply to manage drought.**
- Enables use of reservoirs to **import power overnight** when prices are low and **export during the day** when prices are higher.
- **Outlet for surplus energy** when water conditions are favourable.

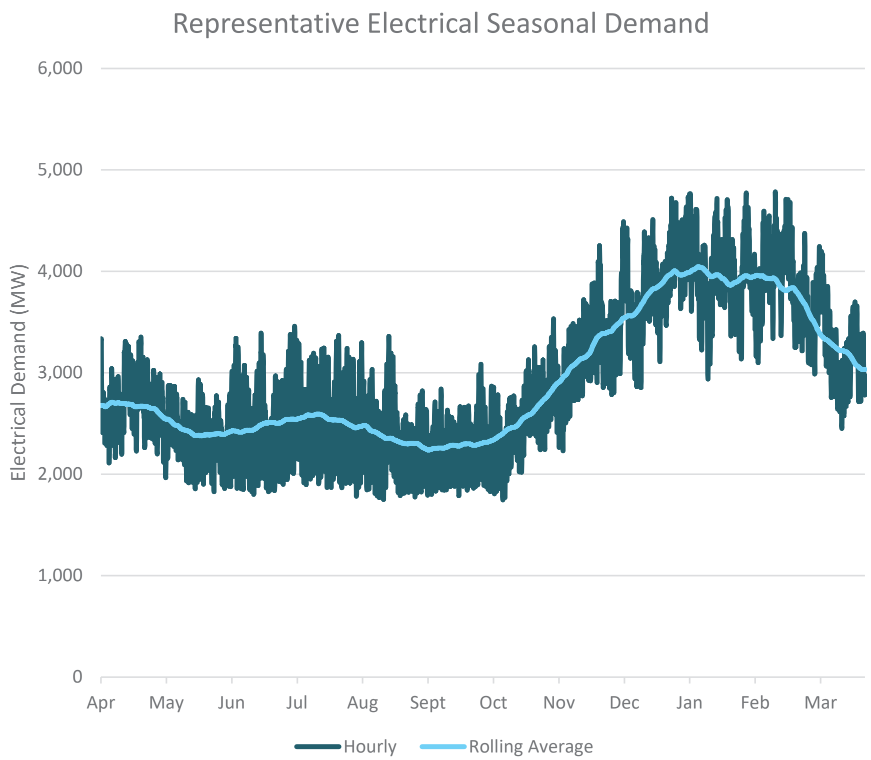
Enable Exports

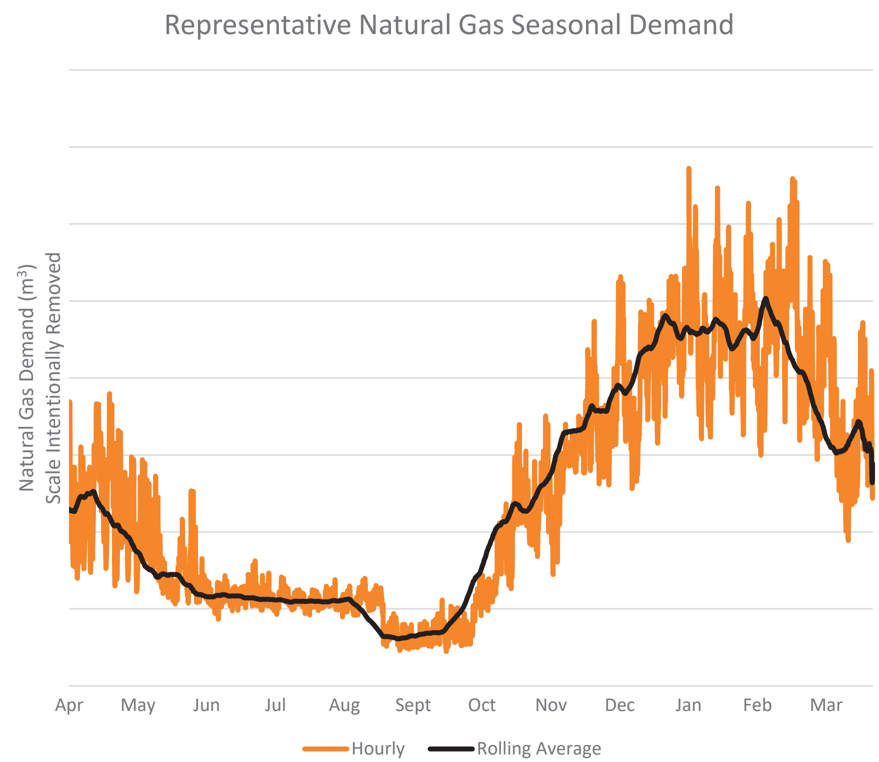
- Long term contracts (“dependable” sales)
- Water supply dependent “opportunity” sales

Maximize regional benefits through capacity sharing



Manitoba's Electricity and Natural Gas Demand Varies

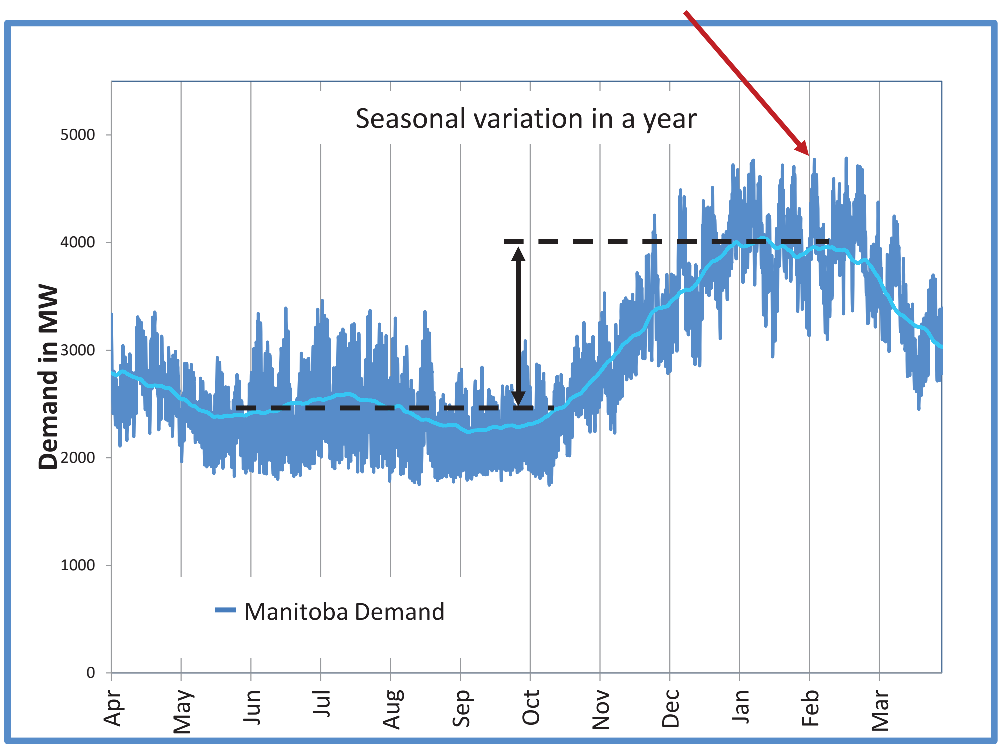


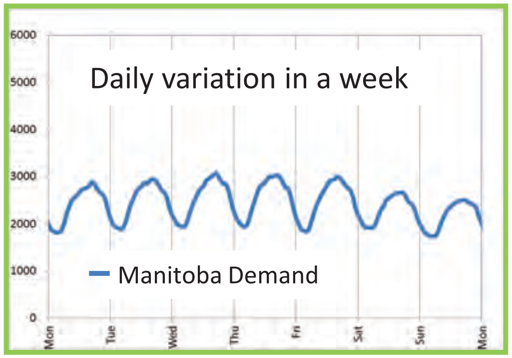


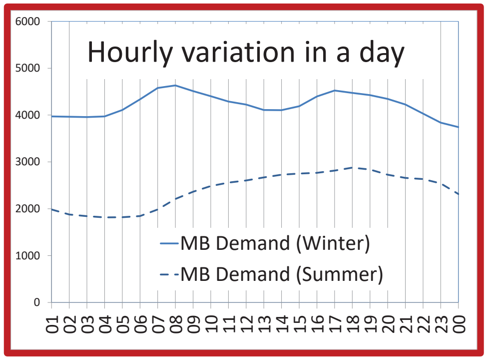
Energy demand changes across seasons, weeks, and days

Example: Electricity demand shown across different time frames

Peak Demand (Capacity)







Electrical peak demand occurs in winter typically before the sun rises or in the evening, after sunset.

Supply and demand must always be in balance so when load increases, generation must increase.

Natural Gas System

Key considerations

- The North American natural gas market is highly integrated.
- Gas distribution systems are planned to deliver firm customer demand on a “design day” (the coldest day) while maintaining adequate pressure for reliable service.
- On the coldest days, Manitoba Hydro's gas distribution system delivers the equivalent capacity of 1.4x the electric system.
- Historic reliability of the natural gas system is 99.99%

Transmission & Distribution

Key considerations

- Interconnecting new distributed generation across the province (i.e. Wind)
- Large Industrial Economic Development opportunities may require significant transmission asset investments
- Distribution is mostly geographically localized
  - Concentration of electric load changes has significant considerations to the distribution system

Source: Generated using Microsoft Copilot, January 29, 2025

Resource Options

2023 IRP Appendix 2 – New Resource Options
https://www.hydro.mb.ca/docs/corporate/irp/irp-2023-a2-new-resource-options.pdf

Resource Options Inventory

Dispatchable & Mature	Intermittent & Mature	Dispatchable & Emerging

All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in service.**

This list shows all potential resource options available, however, some may not be available under specific Resource Options Strategies.

Resource Options Have Different Characteristics

Characteristics captured in our modelling include:

- Installed Capacity
- Firm Capacity
- Operating Parameters
- Dependable Energy
- Development Timelines
- Economic Life
- Capital Costs
- Transmission Costs
- Fixed Operating Costs
- Variable Operating Costs
- Fuel Costs
- GHG Emissions

Characteristics define how each resource can operate within the energy supply system.

Resource Options Characteristics Example

	Wind	
Rated Capacity	■■■■■	
Firm Capacity	■	More is better
Dependable Energy	■■■■■	
Development Timelines	■■■■	
Capital Costs	■■	
Operating Costs	■■■	Less is better
Operating Fuel Costs		
Operating GHG Emissions		

Less ■■■■■ More

Wind

Resource Options Characteristics Example*

Less ■■■■■ More

	Intermittent & Mature	Dispatchable & Mature	Dispatchable & Emerging	
	Wind	**Combustion Turbines**	**Small Modular Nuclear Reactors**	
Rated Capacity	■■■■■	■■■■■	■■■■■	More is better
Firm Capacity	■	■■■■■	■■■■■	More is better
Dependable Energy	■■■■■	■■■■■	■■■■■	More is better
Development Timelines	■■■■	■■■■	■■■■■	Less is better
Capital Costs	■■	■	■■■■■	Less is better
Operating Costs	■■■	■	■■■■■	Less is better
Operating Fuel Costs		■■■■■	■■■■	Less is better
Operating GHG Emissions		■■■■		Less is better

* The resources options shown were chosen to illustrate the variation in characteristics across different options and do not represent all available resources.

CHECK-IN

Resource Options Inventory

Dispatchable & Mature | Intermittent & Mature | Dispatchable & Emerging

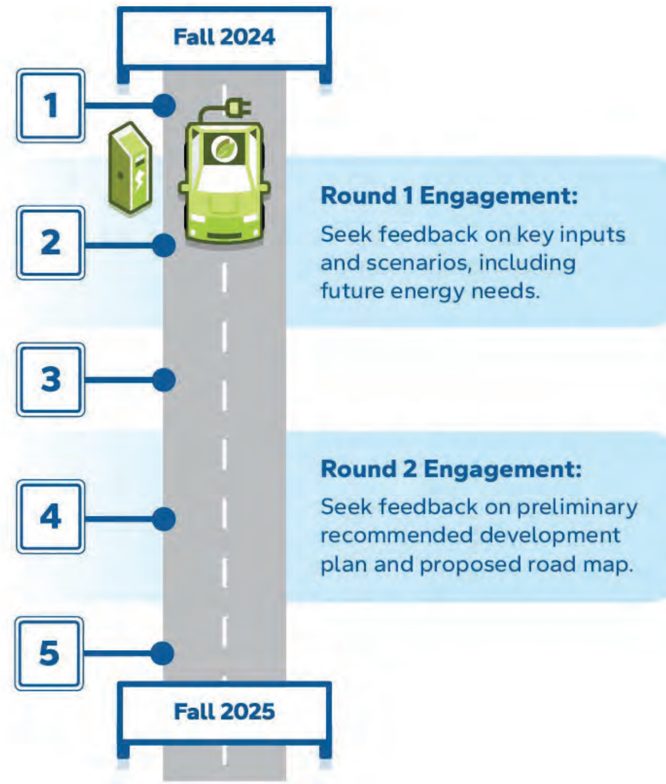
All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in service.**

This list shows all potential resource options available, however, some may not be available under specific Resource Options Strategies.

Next Steps

2025 IRP process overview

1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan



What's Next

February 24, 2025 - Meeting 5

What we heard in Round 1 Engagement

Final Key Inputs, Scenarios and Evaluations Metrics

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Technical Advisory Committee
Spring 2025 – Meeting 6

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Objectives of the session

Today's session is to…

- Share the key feedback heard through our Round 1 Engagement and share updates that have been made to the key inputs, scenarios and evaluation metrics.
- Share preliminary modelling results and observations.
- Continue to ensure transparency throughout the development of the 2025 IRP, using feedback to inform the process.

Agenda

Purpose:
Discuss how we've used past feedback and share early modelling results

Topics

1. Introductions
2. How we are incorporating feedback
3. Load projection sensitivity assumptions
4. Preliminary results
5. Closing/Next Steps

Manitoba Hydro Updates

Since the Technical Advisory Committee meeting in December 2024, we have:

- Completed Round 1 engagement.
- Updated the key inputs, scenarios and evaluation metrics based on feedback.
- Held an optional Technical Advisory Committee meeting in January 2025 (virtual) to discuss key topics in energy planning and resource options.
- Completed preliminary modelling.
- Updated our website, including a new TAC section. https://www.hydro.mb.ca/corporate/planning/

Committee Updates

- Technical Advisory Committee meeting notes and membership list
- Welcoming a new member to the Technical Advisory Committee

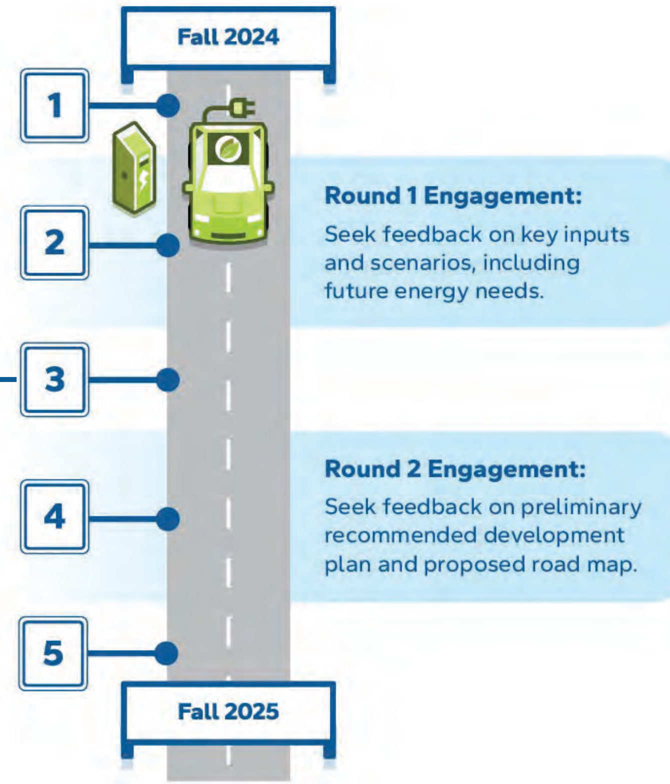
Setting the Stage

Where we are in the process

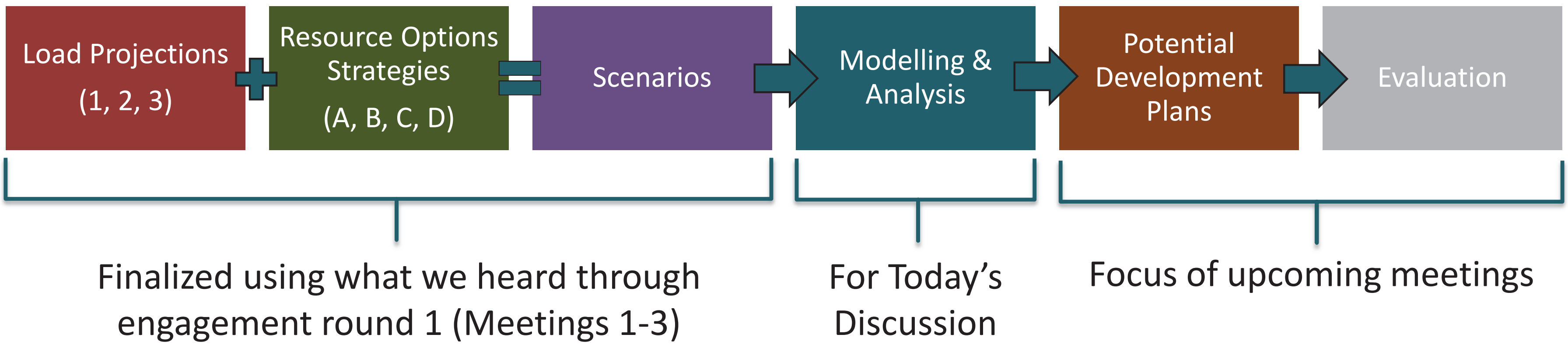
The 2025 IRP Process: how we get there

1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan

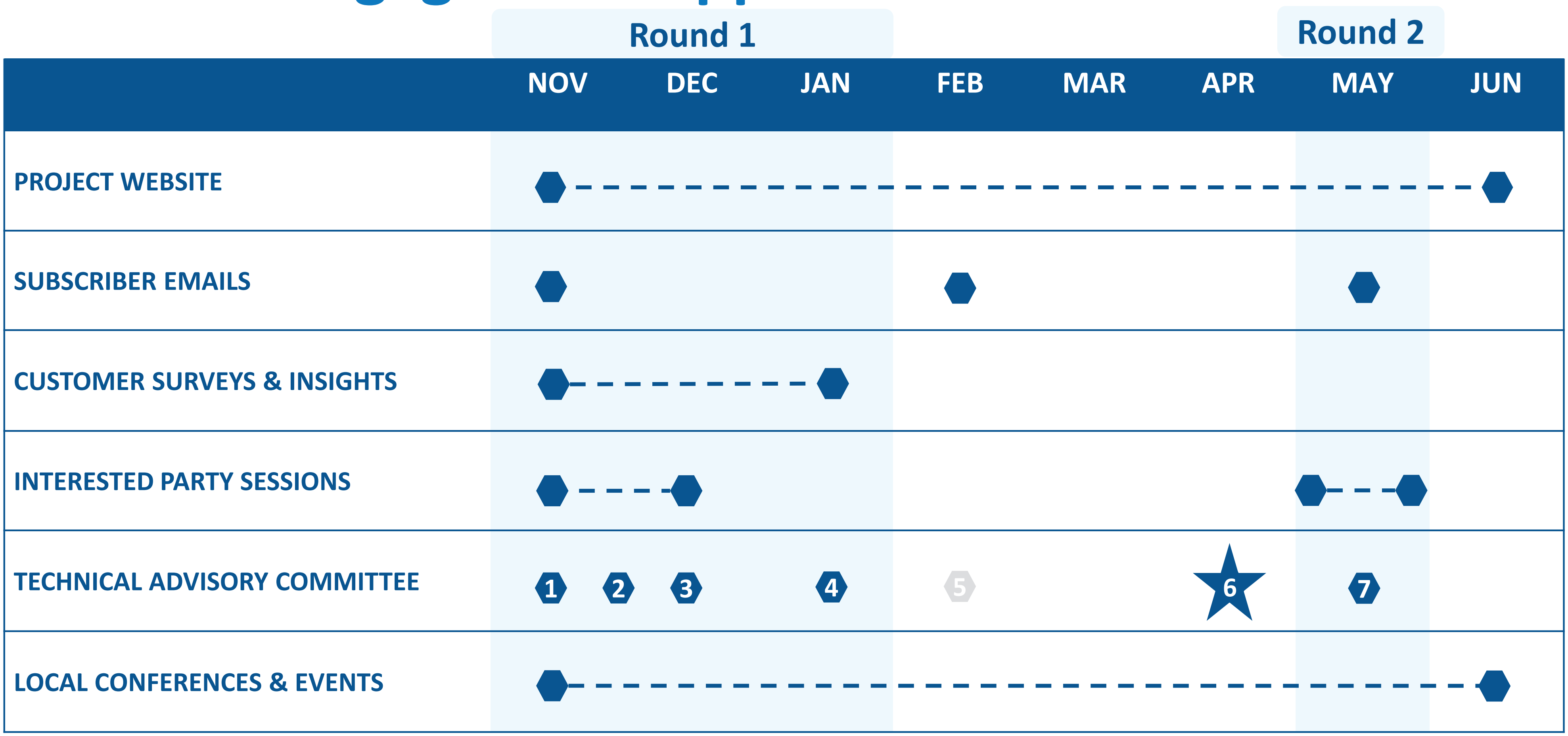
– we are here



Modelling, analysis, and evaluation process



2025 IRP engagement opportunities



- We are here

A Note About Information Included in this Presentation

This is an interim update for discussion purposes. It is not a formal report for the IRP. Conclusions and learnings will evolve as the development of the IRP progresses.

Today's results are primarily based on generation resource modelling for the electricity system. Results indicate that investment in transmission and distribution for the electricity system and natural gas system upgrades will be required.

Analysis on the impacts of system integration (between the electricity and natural gas systems) will be completed later in the IRP development process.

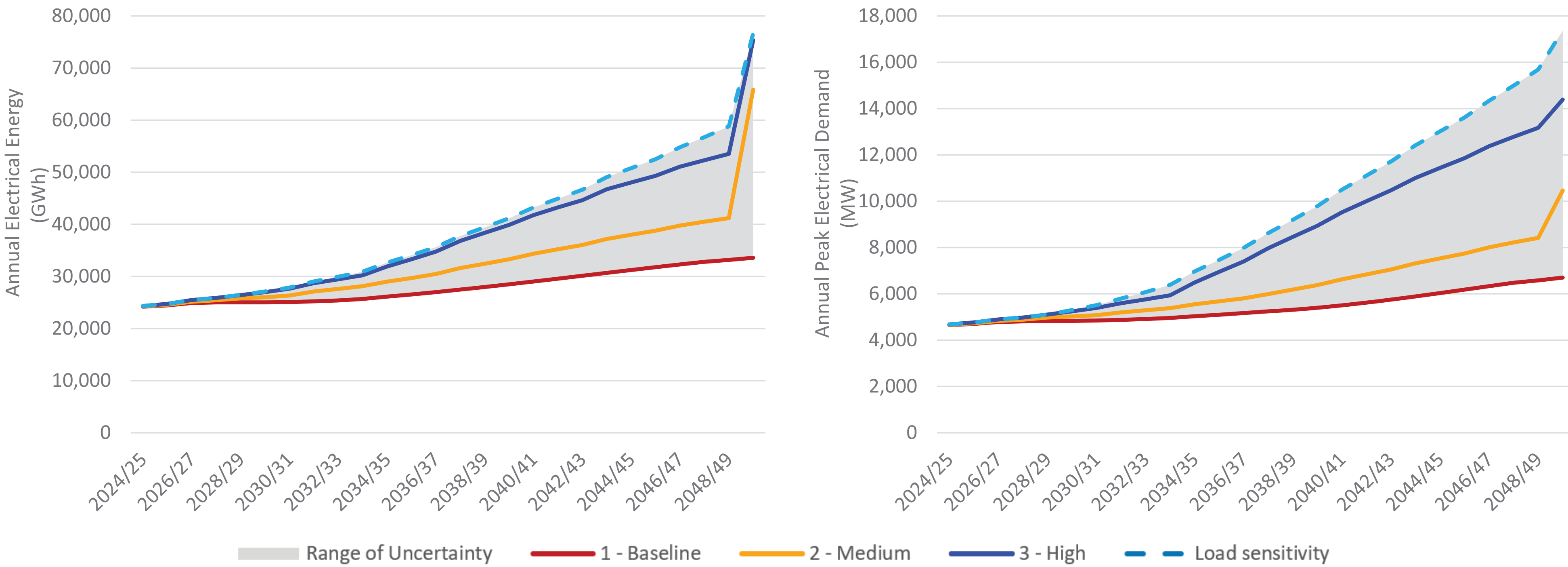
How we are incorporating feedback

Key Inputs & Scenarios

Feedback confirmed the three load projections reflected broad range of potential energy needs in Manitoba

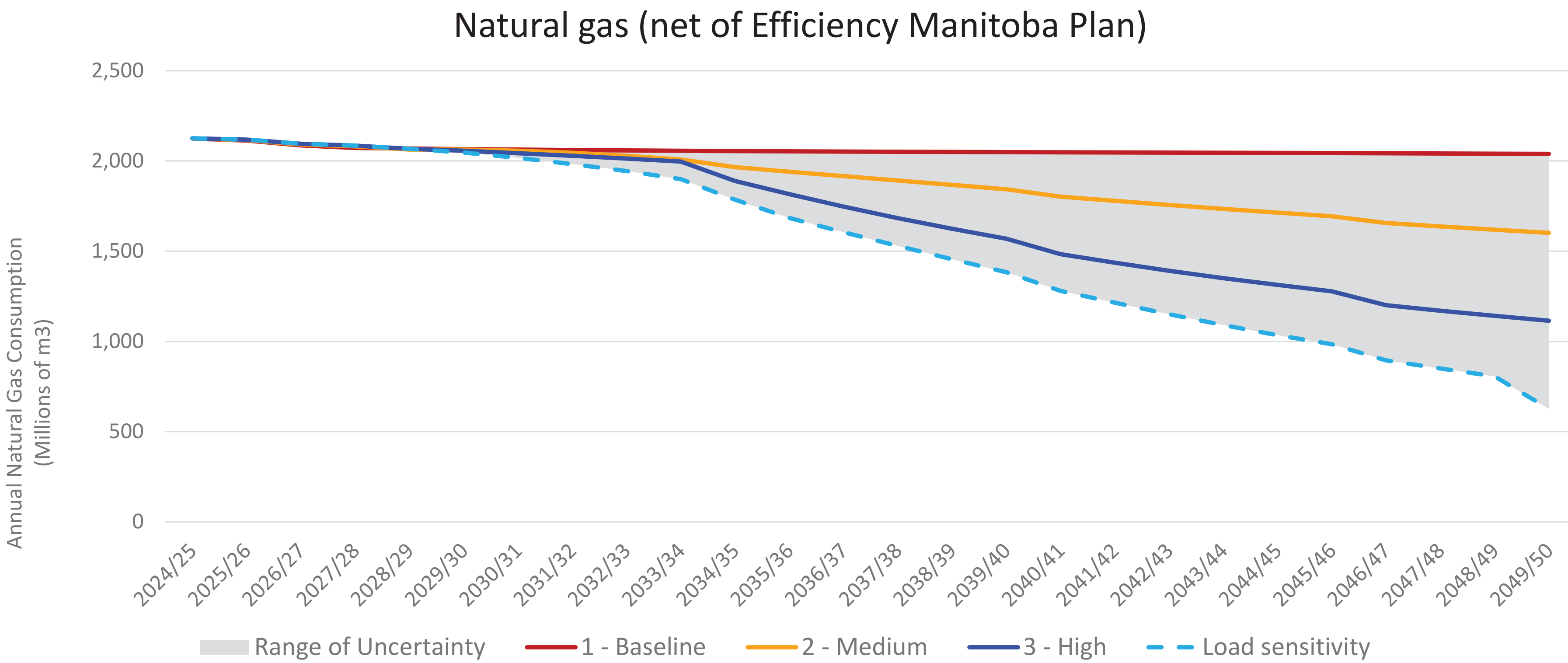
Load sensitivity added to reflect demand if space heating and ground transportation produce no greenhouse gas emissions by 2050

Electric energy and demand (net of Efficiency Manitoba Plan)



Feedback confirmed the three load projections reflected broad range of potential energy needs in Manitoba

Natural gas load projections correspond to electric load projections, including the added load sensitivity.



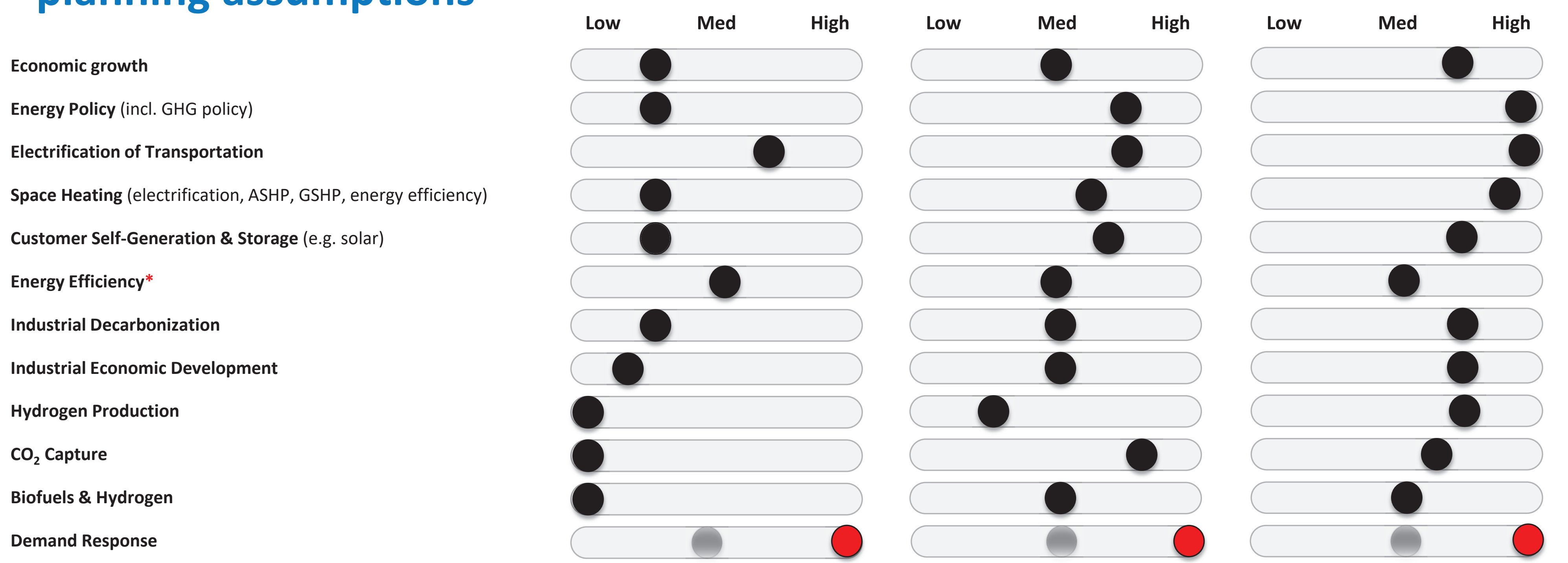
Feedback resulted in clarifications to the load projection planning assumptions

Lower ~~electricity demand~~ anticipated impact | *Higher ~~electricity demand~~ anticipated impact*

1-Baseline Load Projection assumes minimal changes from current policies and customer decisions.

2-Medium Load Projection assumes moderate impact from government actions and customer decisions.

3-High Load Projection assumes significant impact from government actions and customer decisions.



* Includes an Energy Efficiency Plan from Efficiency Manitoba which is extrapolated from their 3-year plan and was developed in collaboration with Manitoba Hydro.

Feedback resulted in a change to one resource options strategy

Updated Strategy D to be less restrictive and added a sensitivity to reintroduce restriction on hydrogen and biomass generation.

Resource Options Strategies		Assumptions
A	Technology Neutral	Compliant with federal Clean Electricity Regulations.
B	Net-Zero Grid 2035	Strategy A, plus requirement that electricity grid is net-zero by 2035.
C	Near Term Wind Generation Projects	Strategy B, plus up to 600 MW of Indigenous majority owned wind with dispatchable resources for reliability.
D	No Fossil Fuel-Based Resources	Strategy B, plus requirement of no fossil fuel-based combustion turbines post 2035 (i.e. no natural gas~~, hydrogen, biomethane, or biomass~~ generation).

Feedback confirmed the eight scenarios

Concurrence that modelling only the most likely scenarios was an acceptable strategy.

Resource Options Strategies	Load Projections		
	1 - Baseline	2 - Medium	3 - High
A - Technology Neutral	S1A	-	-
B - Net-Zero Grid 2035	S1B	S2B	S3B
C - Near Term Wind Generation Projects	S1C	S2C	S3C
D – No Fossil Fuel-Based Resources	-	-	S3D

S = Scenario
Scenarios range from **1A to 3D**, where the number represents a **Load Projection** and the letter represents the **Resource Options Strategy**.

Only likely combinations of load projections and resource options strategies will be studied.

- Those proposed not to be studied are noted by (-).

Feedback led to changes in 1st priority sensitivities

Changes reflect clarifications requested and feedback heard

1st Priority Sensitivities	
High Market Prices	Test the influence of market prices on resource selections.
Low Market Prices	
Capital Costs	Test the influence of high capital costs on resource selections.
In Service Date (ISD) Changes	Test how delaying the availability of resources influences a development plan.
Direct Air CO_2 Capture (DAC)	~~Test if the load increase due to the inclusion of DAC for reducing non-combustion emissions impacts the development plan.~~ Test if removing DAC for non-combustion emissions in 2049/50 changes the need for resource options in the development plan timeline.
Selectable Energy Efficiency	Test the value of seeking energy efficiency beyond the levels in Efficiency Manitoba's demand side management (DSM) plan, extended to 2050.
Adjust assumptions in Resource Options Strategy D (No Fossil-Fuel Based Generation)	Test the impacts if further restrictions were placed on Resource Option Strategy D, to also exclude ~~of not including~~ hydrogen combustion turbines and biomass generation.
Load Sensitivity: Absolute zero ground transportation and space heating emissions	Test the impacts of assuming that all space heating and ground transportation is replaced by non-emitting options by 2050.

Not all sensitivities will be applied to all scenarios.
Prioritization will vary based on the Scenario **and will evolve as modelling results become available.**

Feedback confirmed the 2nd and 3rd priority sensitivities

2nd Priority Sensitivities	
Demand Response	Test the value of demand response to the Manitoba Hydro systems.
New Hydrogeneration (Any Project)	Test which hydrogeneration resource option(s) we would build, if we were required to build at least one new hydrogeneration resource.
Hydro Upgrade Projects	Understand potential value of hydrogeneration upgrade projects by requiring their selection.

3rd Priority Sensitivities	
No New Hydrogeneration	Test the value of hydrogeneration resources.
Continued Use of Existing Fuel-Based Resources	Test the importance of continued use of existing fuel-based resources when new fuel-based resources are restricted.
Hourly Price Profiles	Test if resource selections sensitive to market prices are further influenced by hourly market price profiles.

Not all sensitivities will be applied to all scenarios.
Prioritization will vary based on the Scenario **and will evolve as modelling results become available.**

Evaluation metrics

Updated theme name and evaluation metrics name

Reliability

Adequate Supply

Resource Diversity

Technology Maturity

Costs

Net System Costs

Customer Direct Costs

Environmental

GHG Emissions

Environmental Considerations

~~Social~~ Socio-Economic

Economic Reconciliation

~~Socio-Economic Benefits~~

Economic Opportunities

Load Projection Sensitivity Planning Assumptions

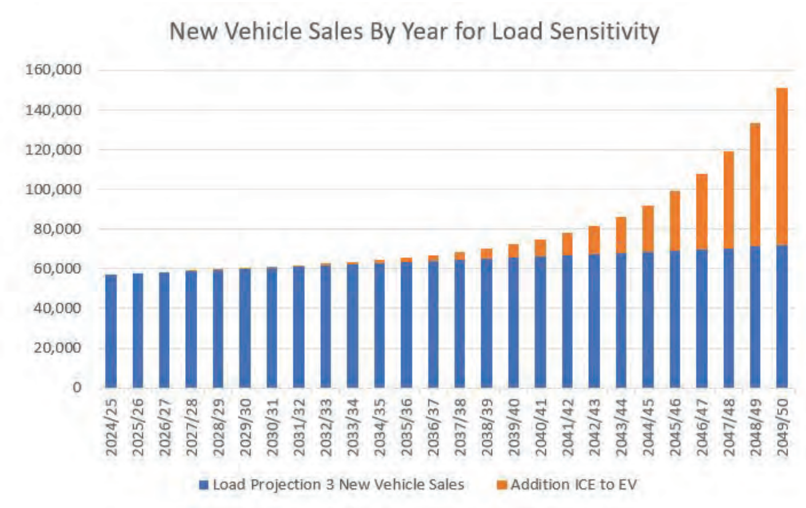
Moved away from the guiding principles used to develop the three load projections

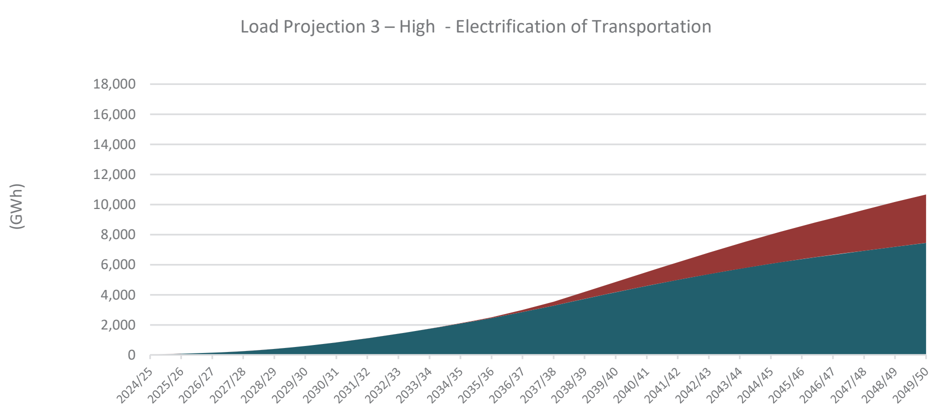
- Replace heating systems and vehicles before they reach end of life.
- Remove all natural gas equipment for customers when they replace space heating systems.
  - Extended this to include smaller industrial and commercial natural gas applications.
- Significantly increase market demand for products (i.e. heating systems & vehicles), which ends abruptly in 2049/50.

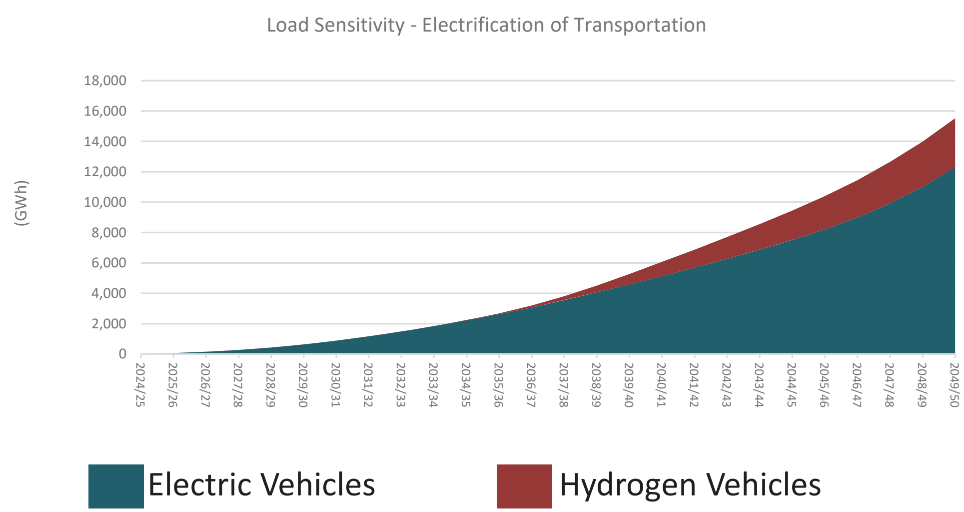
Load projection sensitivity

Ground transportation assumptions

- **Manitoba market demand for vehicles may exceed supply** – The load sensitivity requires over 360,000 additional vehicles to be replaced which otherwise would not have retired by 2049/50 in load projection 3.
- **Absolute zero will be a challenge for medium & heavy duty –** The load sensitivity assumes all vehicle classes (Light Duty, Medium Duty, Heavy Duty & Buses) are fully replaced with zero emitting technologies where limited options are currently available for the larger vehicles.





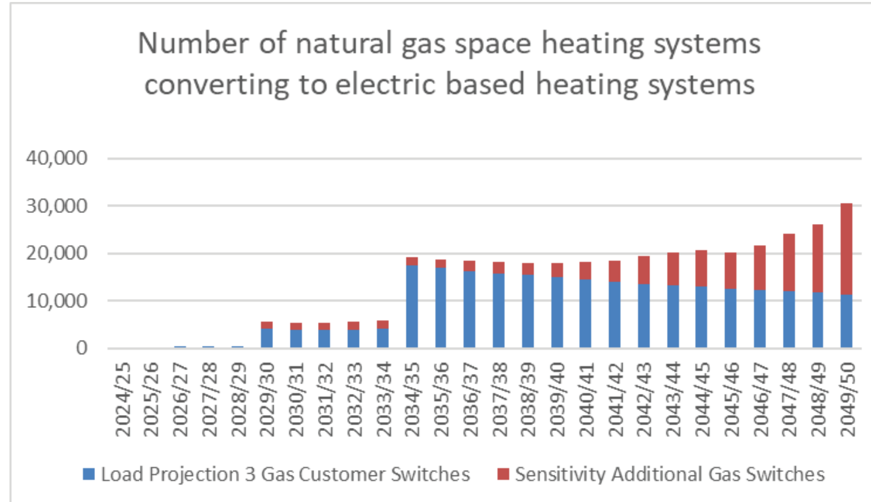


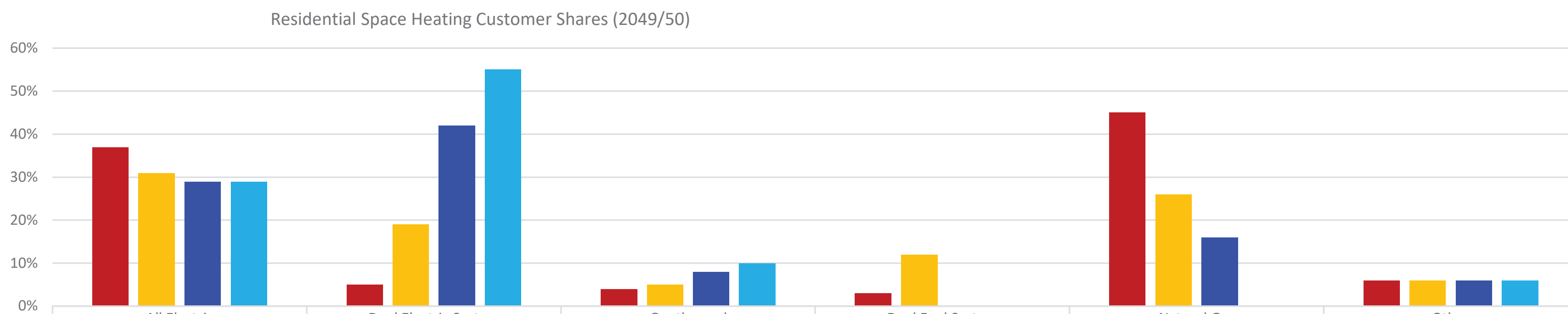
Load projection sensitivity

Space heating assumptions

- **Replacing space heating systems -** Customers are replacing over 110,000 gas space heating systems before they reach end of life and the sensitivity assumes all replacements use alternative technologies such air source heat pumps, cold climate air source heat pumps or ground source heat pump.

- **Market demand could lead to price increases**, and the heating and cooling industry required to ramp up and meet market demand will see an abrupt reduction in demand by over 50% after 2050.



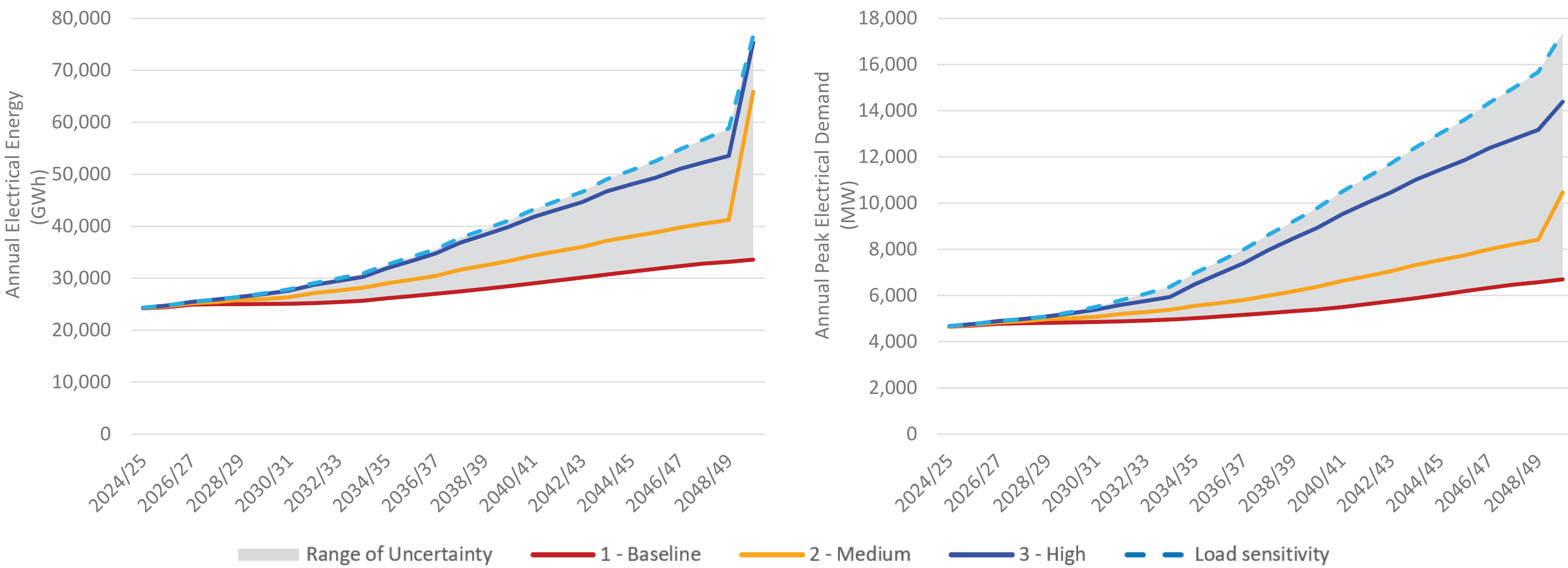


	All Electric	Dual Electric System	Geothermal	Dual Fuel System	Natural Gas	Other
1-Baseline Load Projection	37%	5%	4%	3%	45%	6%
2-Medium Load Projection	31%	19%	5%	12%	26%	6%
3-High Load Projection	29%	42%	8%	0%	16%	6%
Load Sensitivity	29%	55%	10%	0%	0%	6%

Load Sensitivity increases peak demand

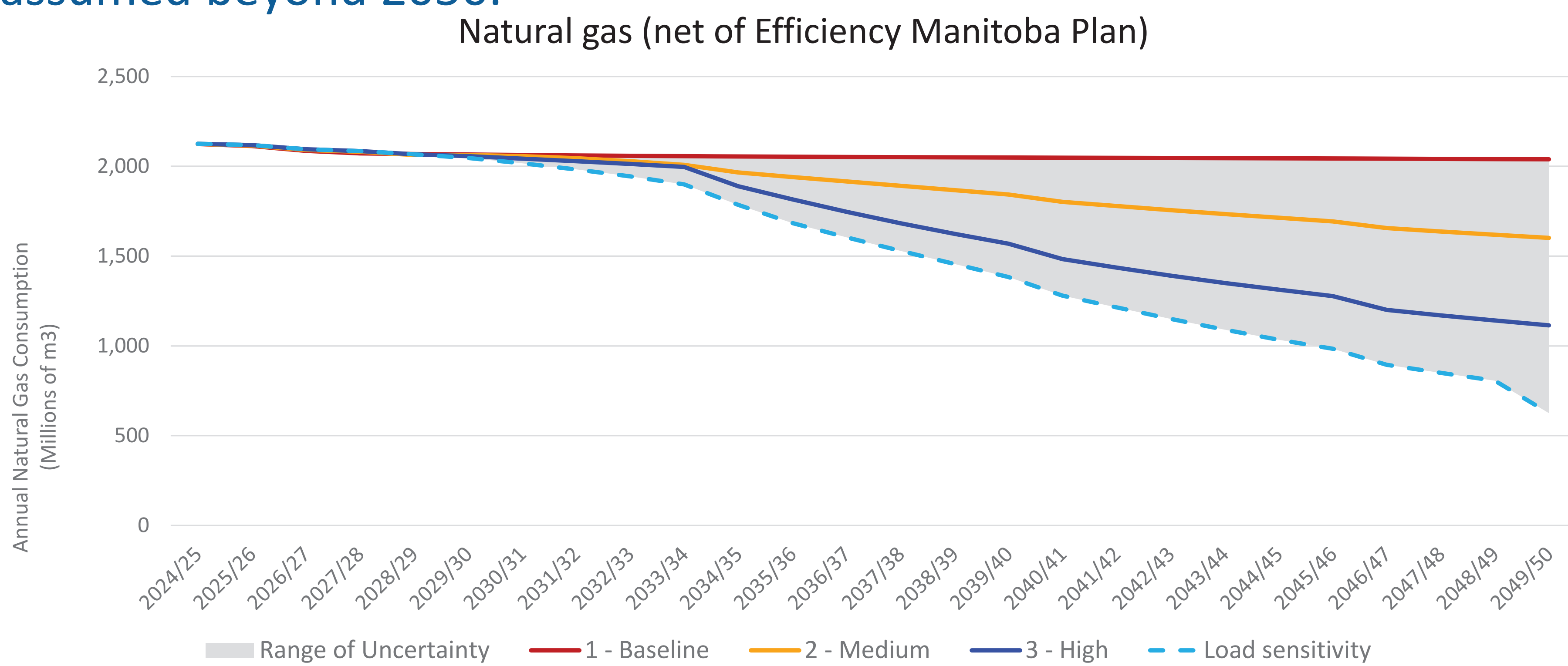
The load sensitivity reflecting absolute zero assumptions for space heating and ground transportation significantly increases peak demand, requiring an additional 3,000 MW of capacity compared to Load Projection 3.

Electric energy and demand (net of Efficiency Manitoba Plan)



Load Sensitivity cuts natural gas consumption in half from load projection 3 by 2049/50

Recognizing the difficulty in replacing some industrial processes, leveraging renewable natural gas and industrial carbon capture and storage technology is assumed beyond 2050.



Additional potential risks within the Load Sensitivity

Moving away from guiding principles used to develop the load projections, by aiming for absolute zero emissions in ground transportation and space heating, creates significant execution risks that need to be addressed.

Some risks include:

- Willingness and affordability of Manitobans to pre-maturely switch out products before end of life.
- Creating accelerated market demand for specific products poses risk of price increases.
- Ability for supply chain to respond to increased market demand.
- Industries heavily involved in the transition (i.e. Heating, Ventilation and Air Condition) face significant reduction of market demand post 2050.
- Challenge and affordability for industrial & commercial customers to find clean alternatives for natural gas appliances currently being used.

Preliminary Modelling and Analysis Results

Preparing for the discussion…

- The printed slides contain information for your reference later
- We'll have regular check-ins along the way
- Let us know if something is missing or unclear
- Share your observations and insights

Setting the Context

Setting the context: The planning horizon

Today we are sharing results for **two** points in the planning horizon.

1. **Mid-term (2035):** This is the point in time for the recommended development plan.
2. **Long-term (2050):** This point is the end of the analysis horizon.

Setting the context: Modelling results to date

We are sharing **preliminary outputs of the model** relating to:

- **Portfolios of resources**
- **Net system costs**
- **Greenhouse gas emissions**

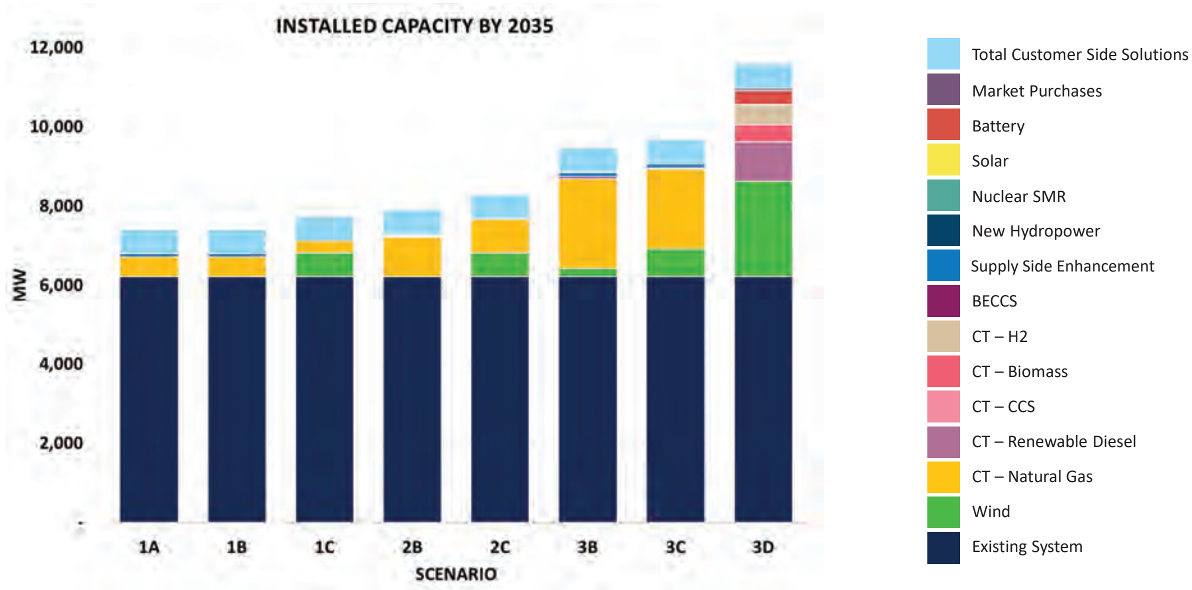
Modelling results are based on economic optimization and do not represent the evaluation metrics.

Setting the context: Conclusions, learnings, and next steps

Today we are sharing **initial observations** – not final recommendations.

- We are sharing **trends and commonalities**, as well as unique and specific observations across scenario and sensitivity results.
- **More analysis and evaluation is required** to yield final recommendations.

Portfolios of Resources are a modelling output



CT = Combustion Turbine

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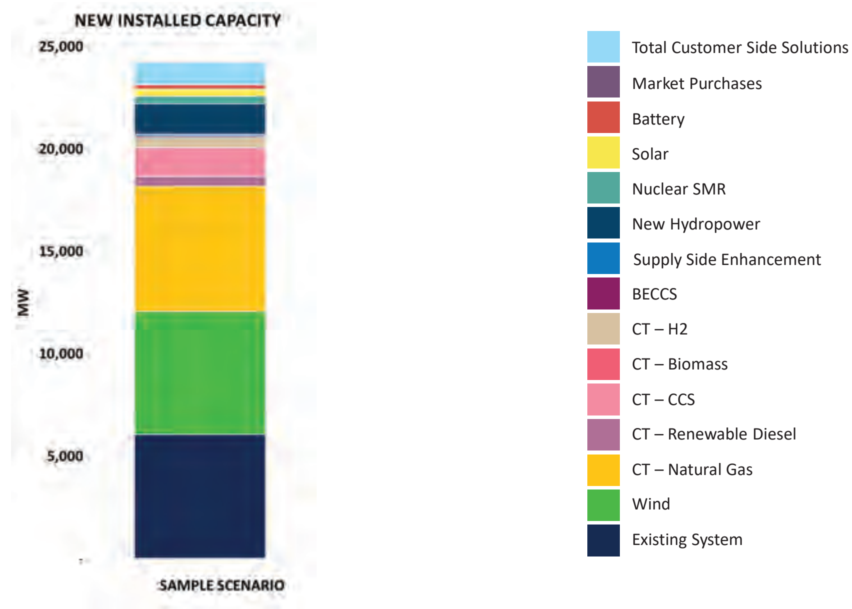
- Our ~6,000 MW of installed capacity is foundational to our system.
- For each of our eight scenarios, there is a portfolio of resources that could be installed by 2035.

Setting the context: Looking closer at a sample portfolio of resources



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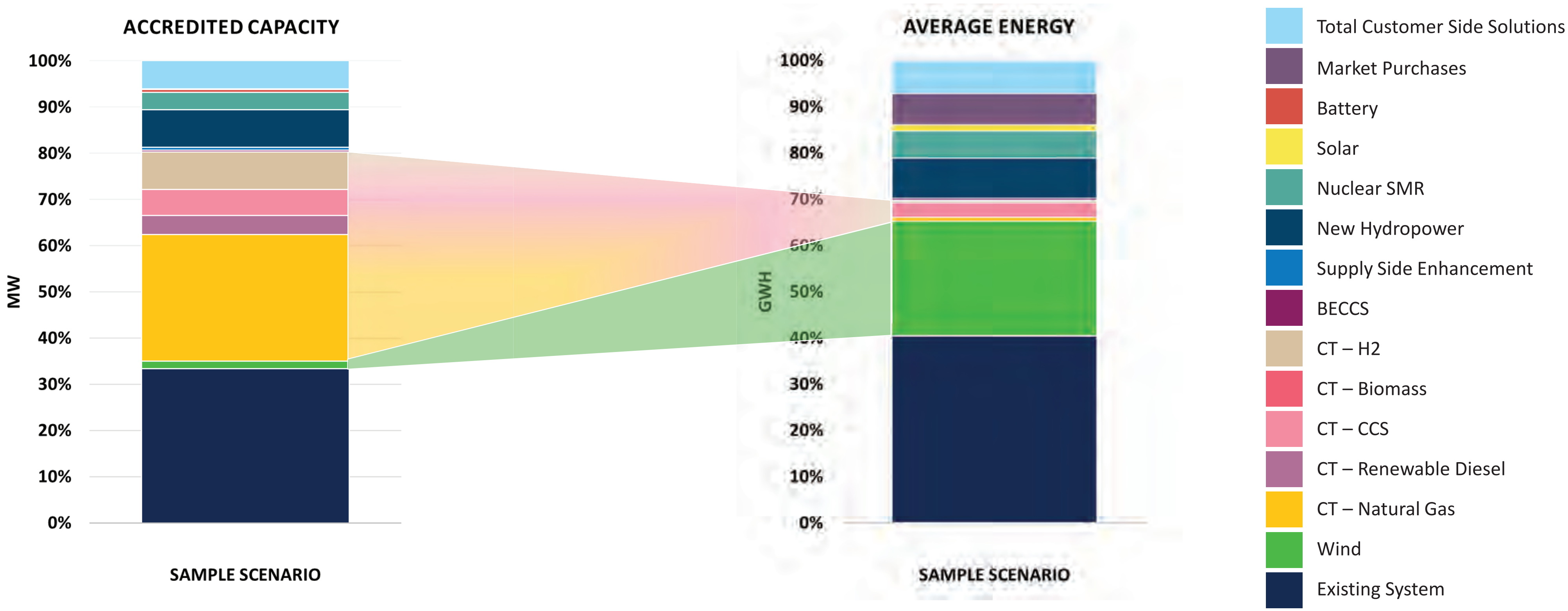
Zooming in on a sample portfolio of resources, we see:

- **Customer-side solutions** e.g. efficiency programs;
- **New hydropower**;
- **Combustion turbines** (CT) with a variety of fuels;
- **Wind**;
- **Small modular nuclear reactors** (Nuclear SMR);
- **Our existing system**;
- Other resources.

The portfolio of resources must provide sufficient accredited capacity. However, Anticipated energy use could look different.

Across all scenarios, combustion turbines are only run to serve capacity needs, while other resources like wind are used for energy needs.



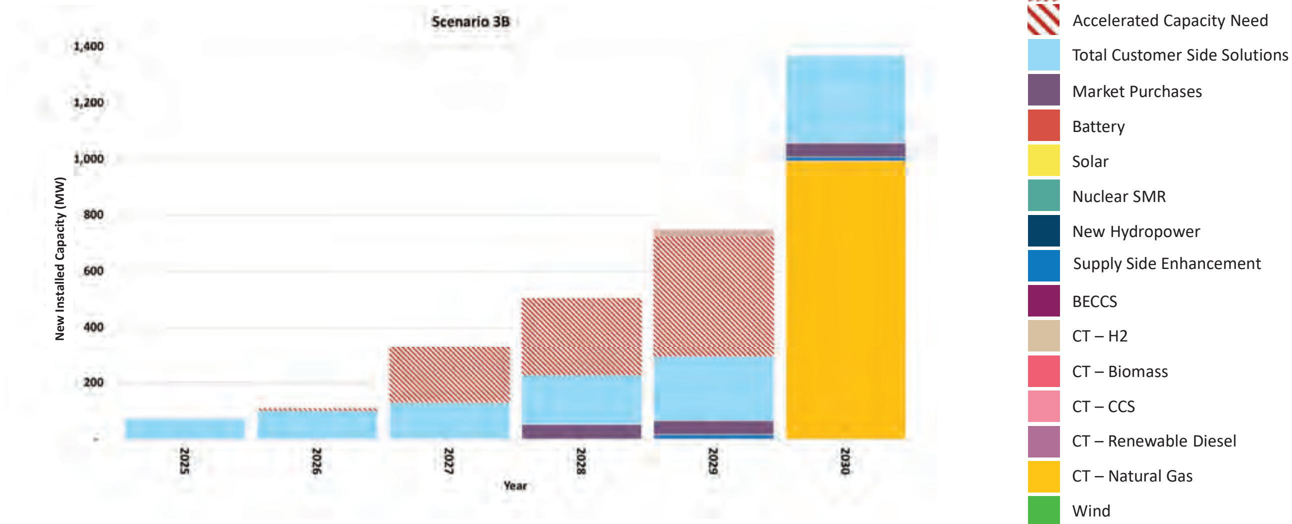
Mid-Term Portfolio of Resources (2035)

Scenario Results & Observations Summary: Mid-Term Portfolios of Resources (2035)

- The **existing system plays an important role** in serving future energy needs.
- **Combustion turbines** are the dispatchable capacity resource **used to follow load**.
- Balancing cost and reliability, modelling **consistently selects natural gas** as a fuel source for combustion turbines, unless the model is restricted from selecting natural gas as the fuel for combustion turbines (as in scenario 3D).
- Wind and combustion turbines are both **scalable (can be built in increments that better match load growth) resources**, unlike new hydropower.
- **Increasing restrictions** on resource options **increases the total MW installed** and **increases the variety of resource options** required to serve future demand and is in direct conflict with the concept of affordable energy.
- Many resource options **cannot be put into service prior to 2035** to serve mid-term demand because of long-lead times, environmental licensing, and technology maturity.

Scenario Results & Observations: Hatched areas show that policy decisions need to be made to ensure that the load that requires these resources doesn't materialize in this timeframe.

Mid-Term Portfolios of Resources (2035)



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- Load projections based on net-zero economy by 2050 require early and significant load growth, which advances the need dates for both energy and capacity.
- The range of resource options available in this timeframe is limited.
- Given the types and timing of options, new resources will be added more closely to load growth during this timeframe.
- Adapting to significant and early load increases will be challenging to serve.
- Manitoba's current regulatory environment does not allow space to respond to rapid load growth and does not allow supply to be added ahead of load.

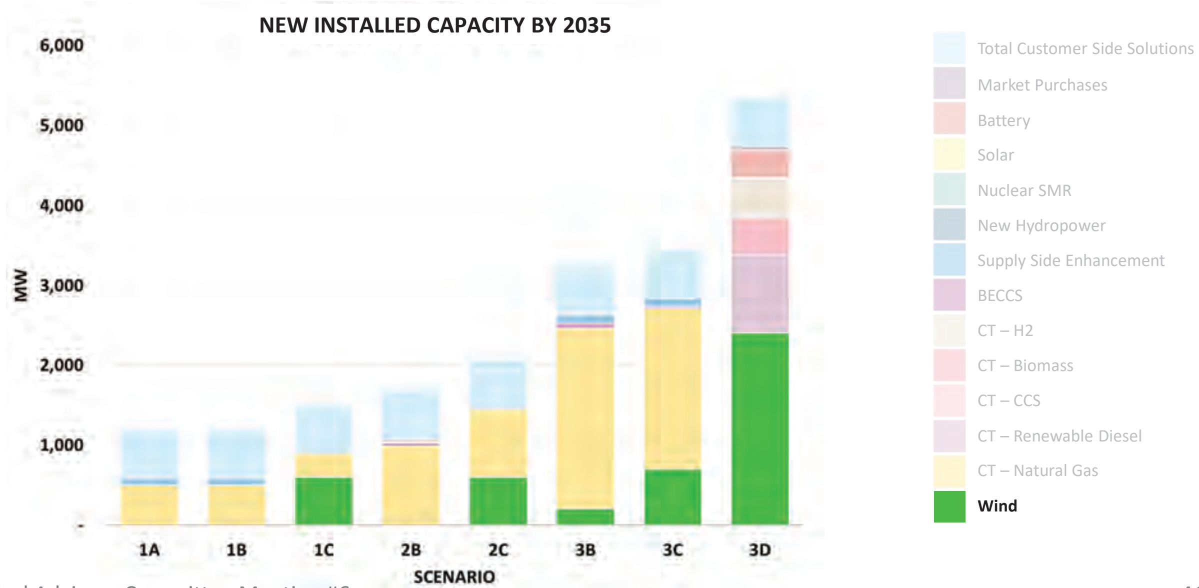
Scenario Results & Observations: Total Customer Side Solutions

Mid-Term Portfolios of Resources (2035)

- Customer Side Solutions include:
  - Efficiency Manitoba's extended 3-year plan
  - Additional selectable energy efficiency programs
  - Demand Response
  - Curtailable Rate Program
  - Customer owned generation
  - Air source (dual electric and dual fuel)
  - Ground source heat pumps
- In the short-term, up to ~2030, options include demand response and curtailable rate program.
- In the mid-term, up to ~2035, market options, which are only included in the model when confirmed, continue be pursued. These options include seasonal diversities.

Scenario Results & Observations: Wind

Mid-Term Portfolios of Resources (2035)



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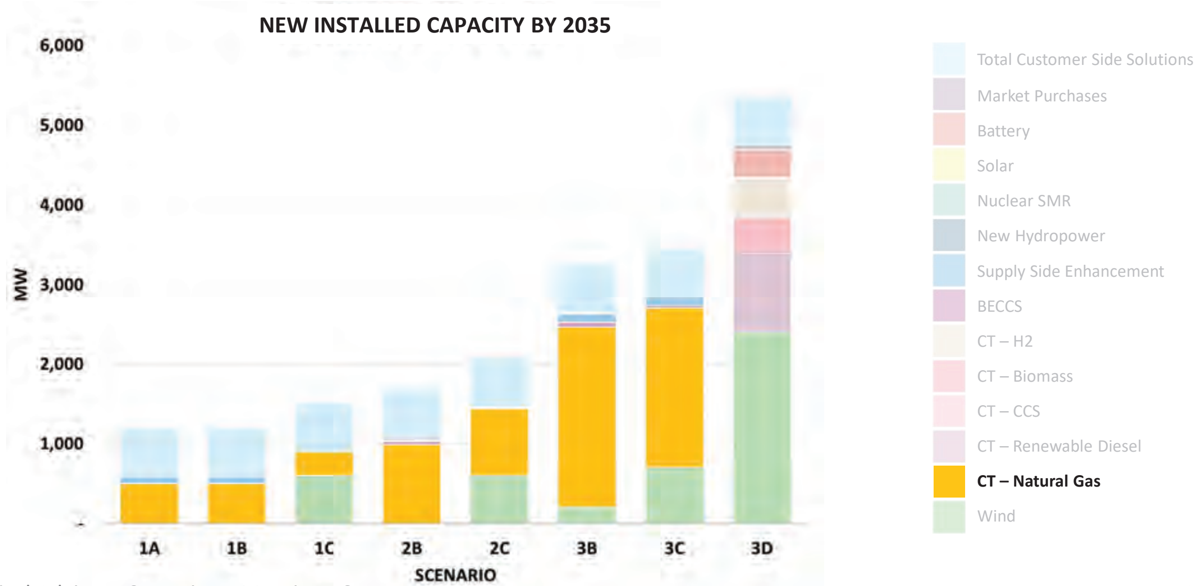
- Export prices have a significant impact on how much wind is selected.
- Aligning with the Affordable Energy Plan, scenarios with resource option strategy C include wind.
- In the mid-term, modelling is not selecting wind in scenarios based on load projections 1 or 2.
- Scenario 3D results in significant wind to address energy needs that come with restrictions on natural gas combustion turbines.

Scenario Results & Observations: Natural Gas Combustion Turbines

Mid-Term Portfolios of Resources (2035)



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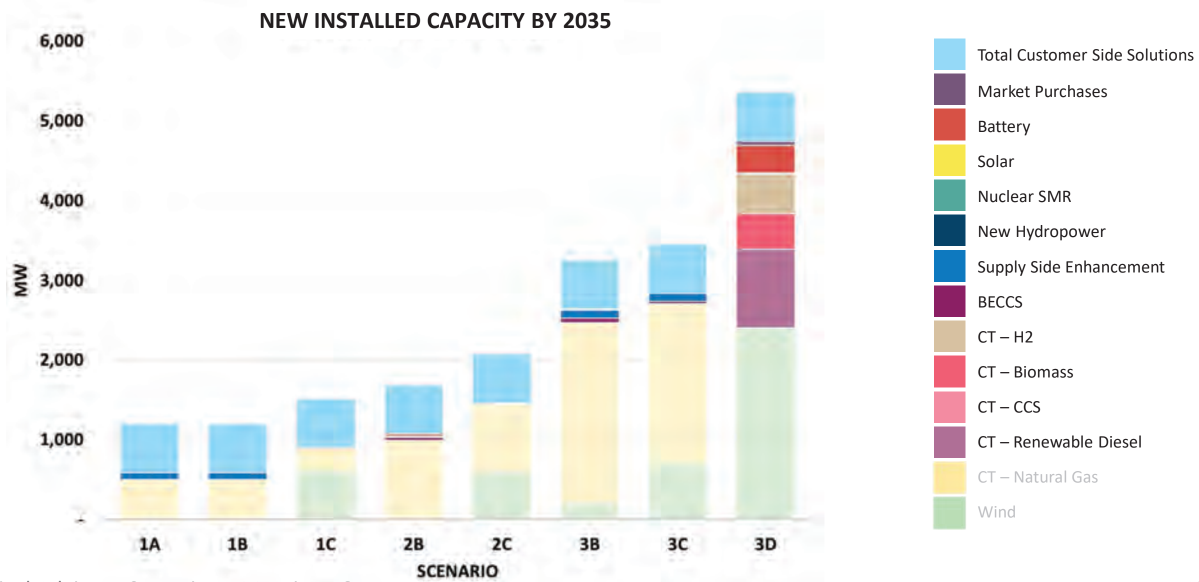
- In each scenario, mid-term modelling selects combustion turbines (CTs) to serve capacity as load grows.
- Modelling consistently selects natural gas as a primary fuel source for CTs, unless natural gas as a fuel for CTs is restricted (as in scenario 3D). Even in this scenario, CTs are still selected.

Scenario Results & Observations: Other resources

Mid-Term Portfolios of Resources (2035)



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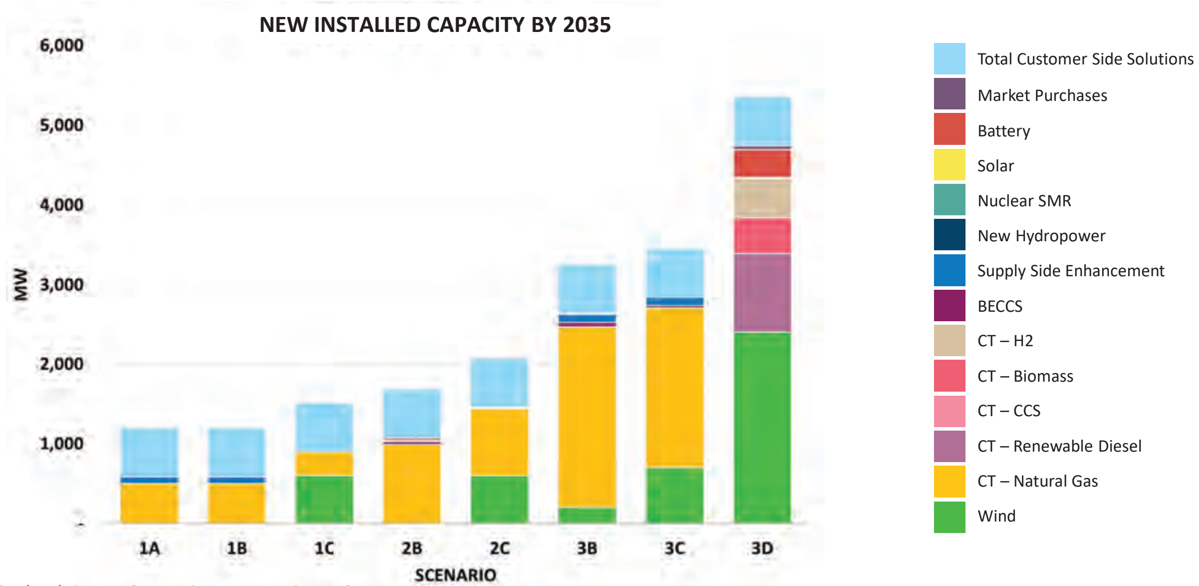
- Modelling results in supply side enhancements (enhancements to existing hydro) in scenarios 1A, 1B, 3B and 3C.
  - There is value to enhancing existing hydro (light blue).
  - There are some constraints that need further investigation.
- When natural gas as a fuel for CTs is restricted (scenario 3D), other resources are accelerated, including batteries, renewable diesel CTs, and hydrogen CTs.

Scenario Results & Observations: Resources not observed in modelling

Mid-Term Portfolios of Resources (2035)



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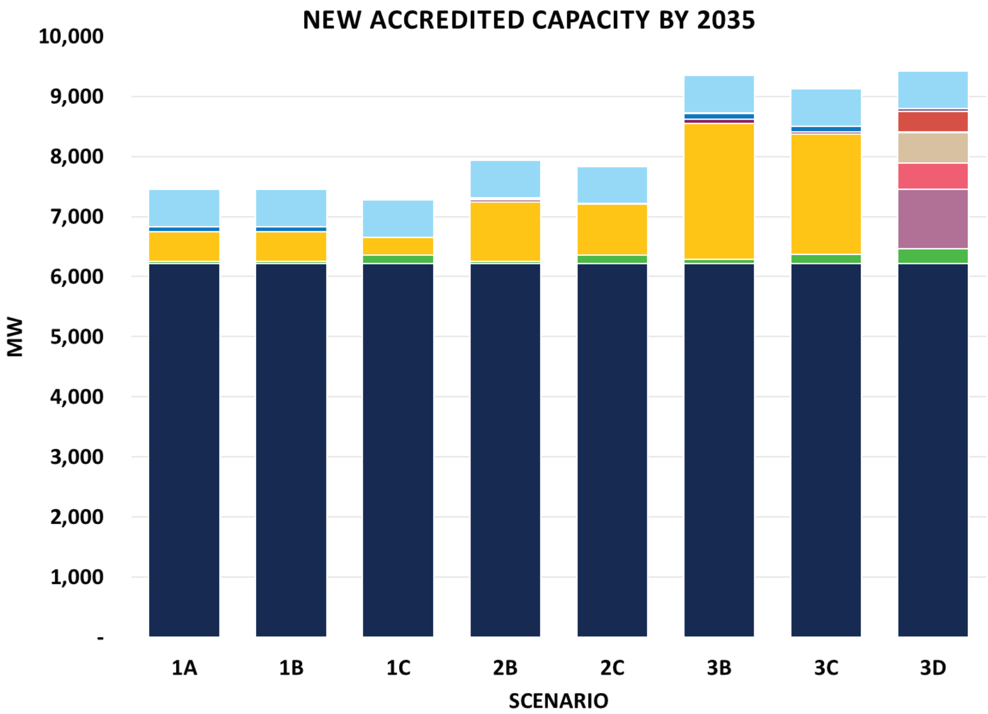
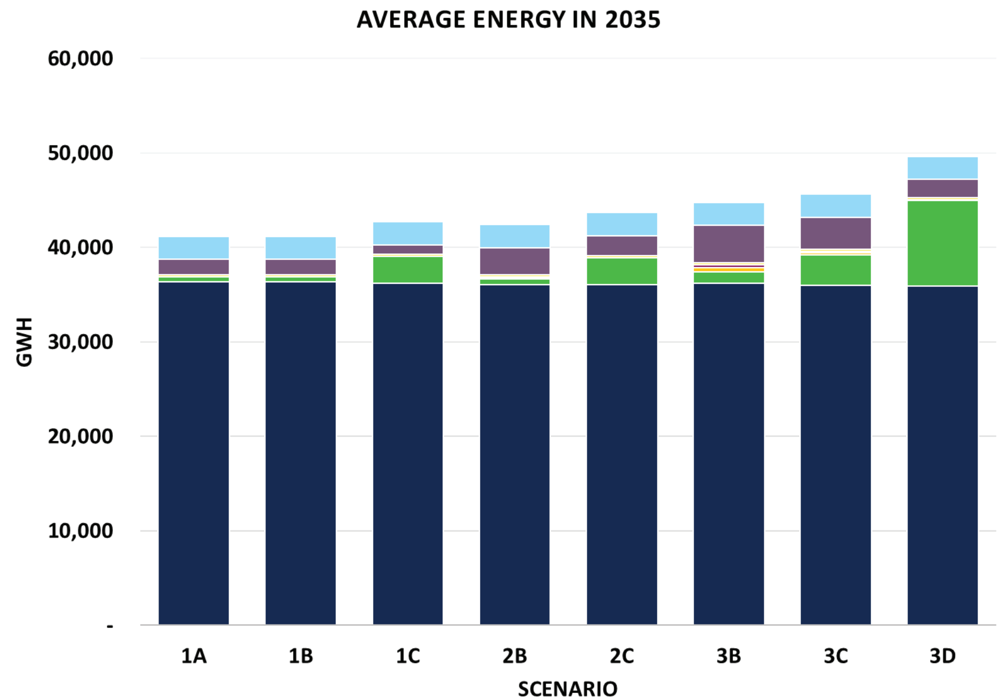
- In the mid-term, solar does not appear in modelling due to its limitations in serving peak demand.
- Small modular nuclear reactors (SMRs) are expensive, have long lead times to develop the technology and significant regulatory requirements, preventing them in the mid-term.
- New hydropower design, licencing, and construction lead times are greater than 10 years.
- Mid-term modelling shows no CTs with carbon capture and storage (CCS), as other, less costly dispatchable resources exist to serve demand.

Scenario Results & Observations: Capacity vs Energy

Mid-Term Portfolios of Resources (2035)





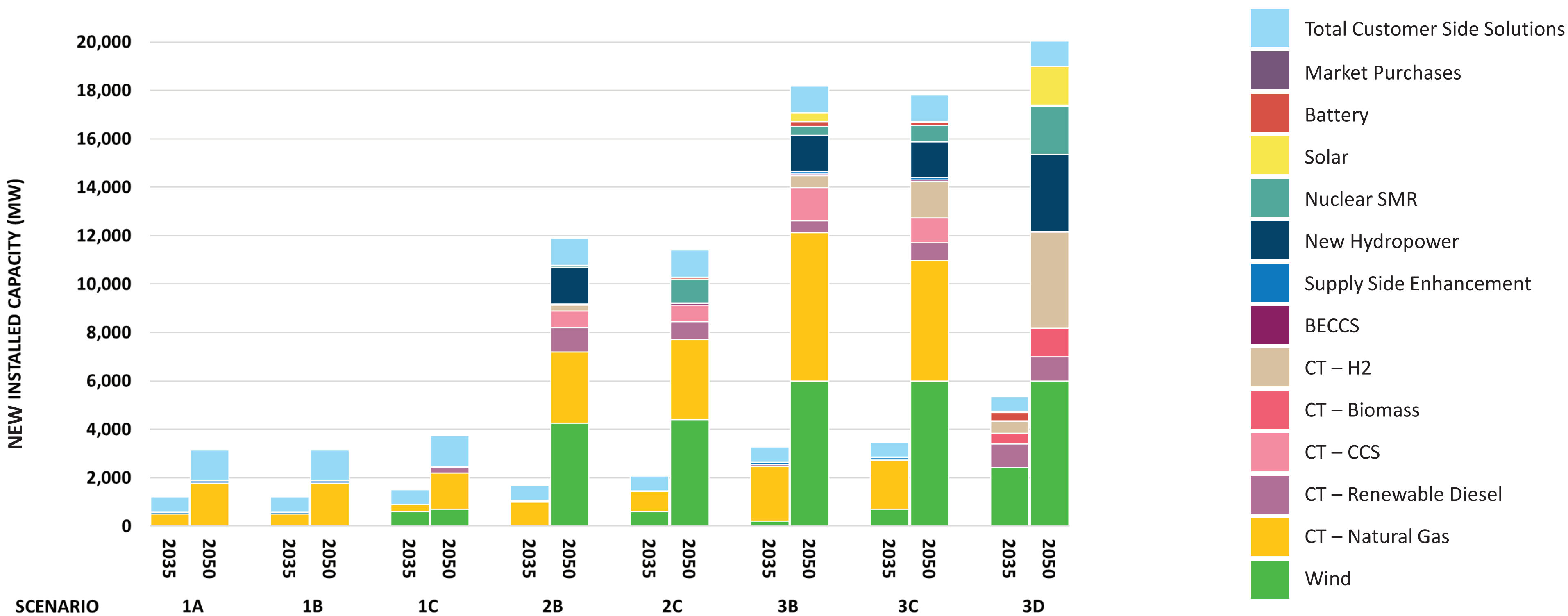
Long-Term Portfolio of Resources (2050)

Scenario Results & Observations Summary: Long-Term Portfolios of Resources (2050)

- Meeting a **net-zero economy by 2050** goal requires **significant new resources**.
- In modelling, **load growth** assumptions and projections **drive the scale of resource build-out**.
- Natural gas combustion turbines continue to be included in modelling – **even in scenarios meeting a net-zero economy**.
- Modelling does not select wind in scenarios 1A, 1B, or 1C (the wind in 1C was an input to the model).
- Longer lead-time resources, like **new hydropower and nuclear small modular reactors (SMRs)**, are included in long-term (2050) modelling.

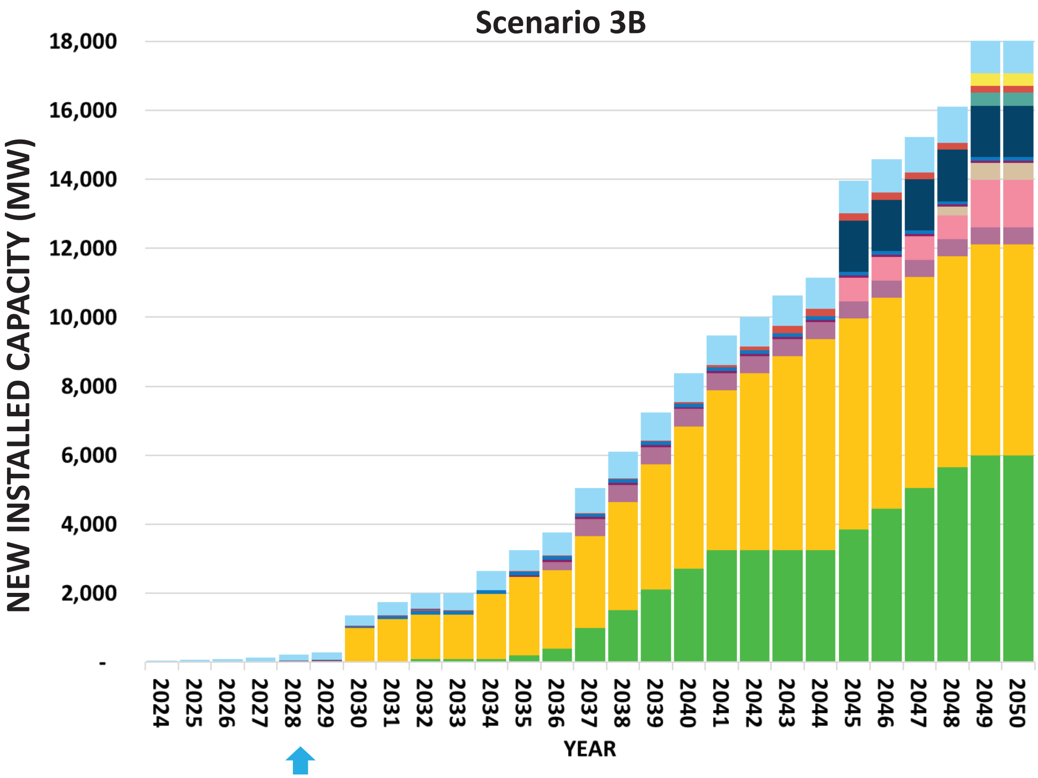
Portfolios of Resources: 2035 vs 2050

There is significant difference in the total MW installed and number of options in the portfolio of resources in 2050 as compared to 2035



Scenario Results & Observations: Resource sequencing

Some decisions need to be made now. Some decisions will be made in future IRPs. Some planning actions will be required now to prepare for the future.

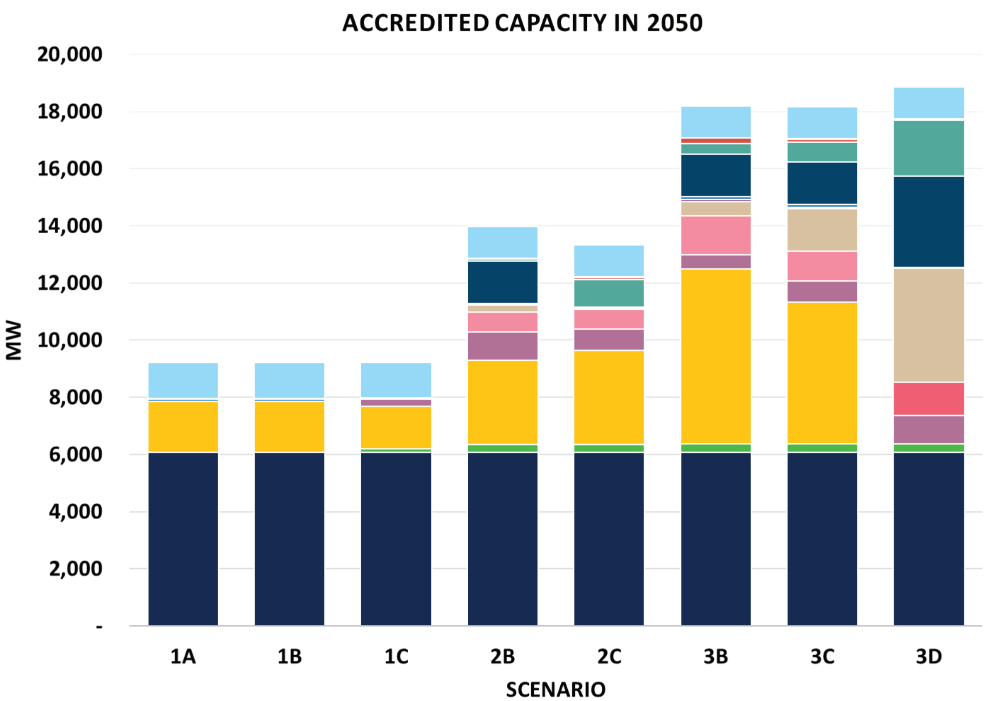


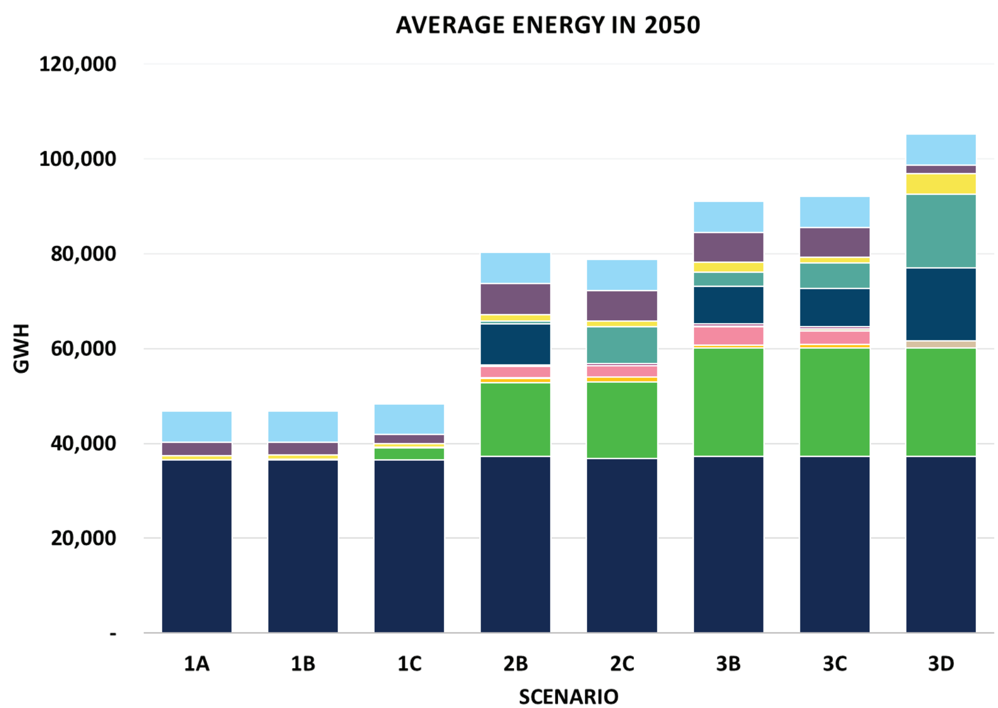
Resource addition highlights	Installed Capacity (MW)					
	2025-2030	2031-2035	2036-2040	2041-2045	2046-2050	Total
CUSTOMER SIDE SOLUTIONS	300	300	200	100	100	**1,000**
BATTERY	-	-	40	160	-	**200**
SOLAR	-	-	-	-	360	**360**
NUCLEAR SMR	-	-	-	-	375	**375**
NEW HYDROPOWER	-	-	-	1,500	-	**1,500**
SUPPLY SIDE ENHANCEMENT	-	100	-	-	-	**100**
CT – HYDROGEN	-	-	-	-	500	**500**
CT CCS	-	-	-	350	1,020	**1,370**
CT RENEWABLE DIESEL	-	-	500	-	-	**500**
CT - NATURAL GAS	1,000	1,300	1,700	1,000	1,000	**6,000**
WIND	-	200	2,500	1,000	2,300	**6,000**

2028: Estimated earliest decision to start planning for new hydropower and nuclear SMR (based on all scenario results)

Scenario Results & Observations: Capacity vs Energy

Mid-Term Portfolios of Resources (2050)



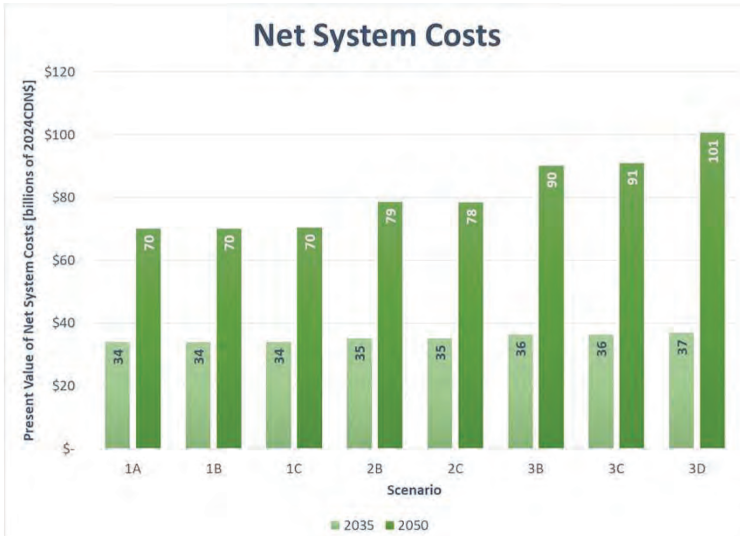


Net System Costs and GHG Emissions

Scenario Results & Observations Summary: Net System Costs

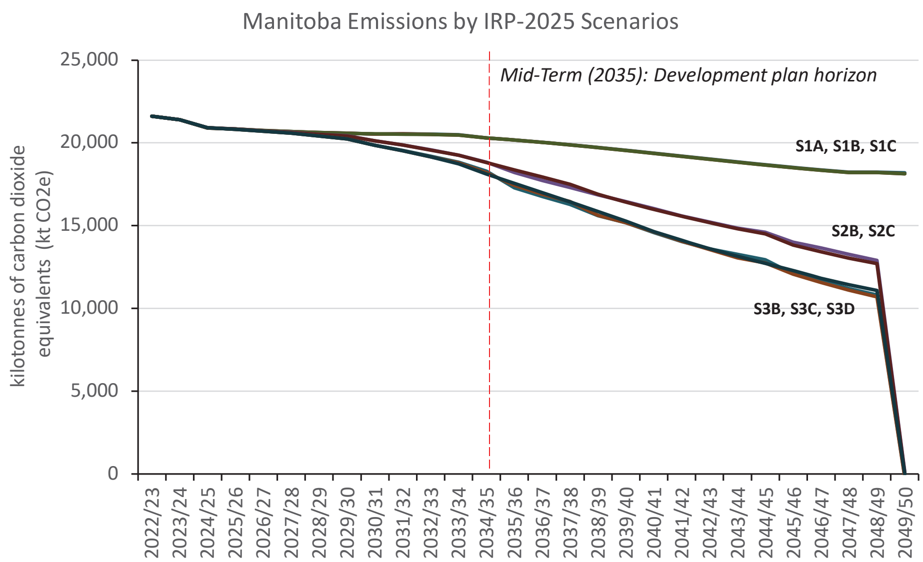
- Different portfolios of resources **result in different net system costs.**
- Modelling shows that **restrictions** on natural gas combustion turbines **increase net system costs**.
- Modelling shows that **committing to the assumptions in a scenario** in the early years **will impact decisions and costs** well into the future.
  - I.e., net system costs in the **mid-term (2035)** are very similar across scenarios.
  - However, net system costs in the **long-term (2050)** are distinct.
- Net system costs are **not a financial analysis**. Financial analysis, including an assessment of rate impact and a customer's energy wallet, will be conducted on the recommended and alternative development plans.

Scenario Results & Observations: Net System Costs, mid-term (2035) vs. long-term (2050)



- Long-term financial impacts should be considered in addition to mid-term costs.
- While modelling results in the mid-term (2035) are close regarding net system costs, decisions made in the mid-term can put us on a path toward long-term (2050) impacts.
- Net system cost are driven mainly by load growth projections and the requirement to meet demand.
- Scenario 3D is the only scenario with restrictions on natural gas generation and the net system costs are ~$10B more, than the other comparable scenarios 3B, 3C.

Scenario Results & Observations Summary: Manitoba Greenhouse Gas (GHG) Emissions



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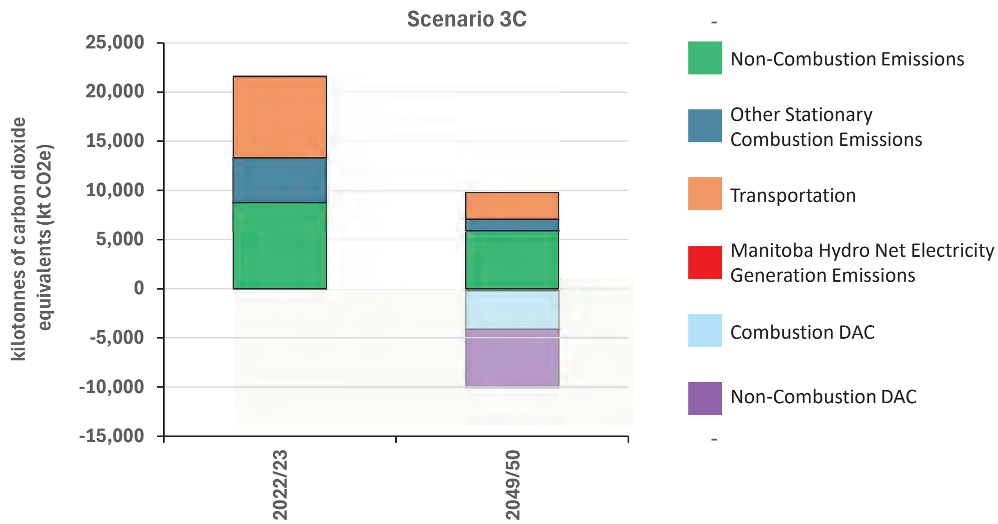
- Manitoba emissions can only be reduced to ~10 Mt through decarbonization efforts. **Negative emission technologies are required to meet net-zero economy by 2050 goals**.
- Scenario results show **resources required to serve the load due to the negative emission technology**.
- A **decision to implement** negative emission technologies will be **made in a future integrated resource plan** with sufficient time to build the technology.
- The negative emission **technology is only turned on when needed**, driven by policy, resulting in the significant drop in emissions in 2050.
- Manitoba Hydro's **potential new generation resources** result in **little impact to** total provincial **emissions reduction**.

Scenario Results & Observations Summary: GHG Emissions by Manitoba Sector, 2022/23 (current) vs. 2049/50



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By 2050:

- Transportation and other stationary combustion emissions decline by 68% and 74%, respectively, from current (2022/23) levels.
- There are minimal generation emissions.
- Non-combustion emissions, which include emissions not as a result of burning fossil fuels (like agriculture) remain a significant part of the overall emissions.
- Negative emission technology, like direct air capture (DAC), is used to meet net-zero economy by 2050.

Sensitivity Analysis & Observations

Testing key planning assumptions with high potential to impact results

Priority sensitivities:

- Higher and lower market prices
- Capital costs for new resources
- Delays in new resource construction
- Direct air CO_2 capture (DAC) impacts
- Selectable energy efficiency, e.g. customer solutions
- Requirements for no fuel-based generation

Observations:

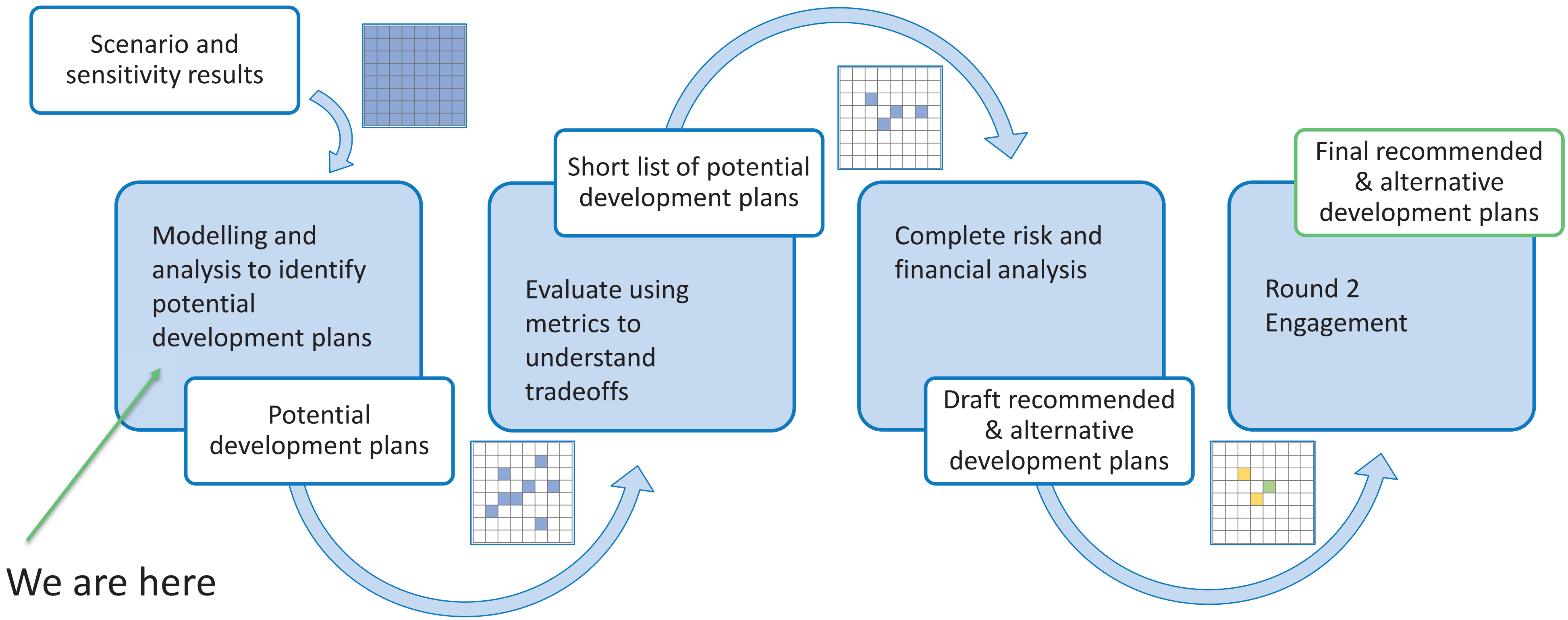
- Majority of sensitivities do not impact the amount of resources, they impact timing.
- Assumptions of using negative emissions technology to achieve net-zero economy by 2050 has no impact on the mid-term portfolios of resources (2035).
- Other resources that showed promise included:
  - Energy efficiency programming
  - Battery
  - Hydrogen CTs
  - Market purchases

*** Not all sensitivities are run on every scenario.**

Next Steps

Evaluation methodology

This is how we move towards a recommended development plan



Next Steps: Shaping Our Energy Future Together

What's next?

May 15 – 1:00pm-3:30pm Technical Advisory Committee Meeting 7 – Preliminary Draft Recommended Development Plan

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Technical Advisory Committee
July 2025 – Meeting 7

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
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Land acknowledgment

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.

AGENDA

Topics:

1. Setting the stage
2. Two key findings from modelling and analysis
3. Summary and discussion
4. Next steps

Purpose of today's discussion

Providing an interim update

- Share two key findings from our modelling and analysis.
- Explain how these findings will contribute to the formulation of potential development plans.
- Share the next steps.

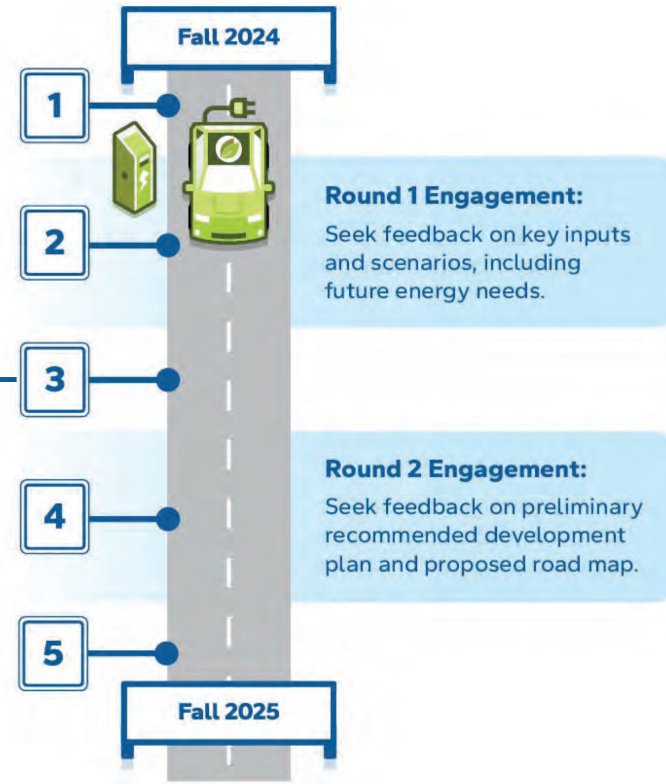
Setting the stage

Where we are in the development process

The 2025 IRP Process

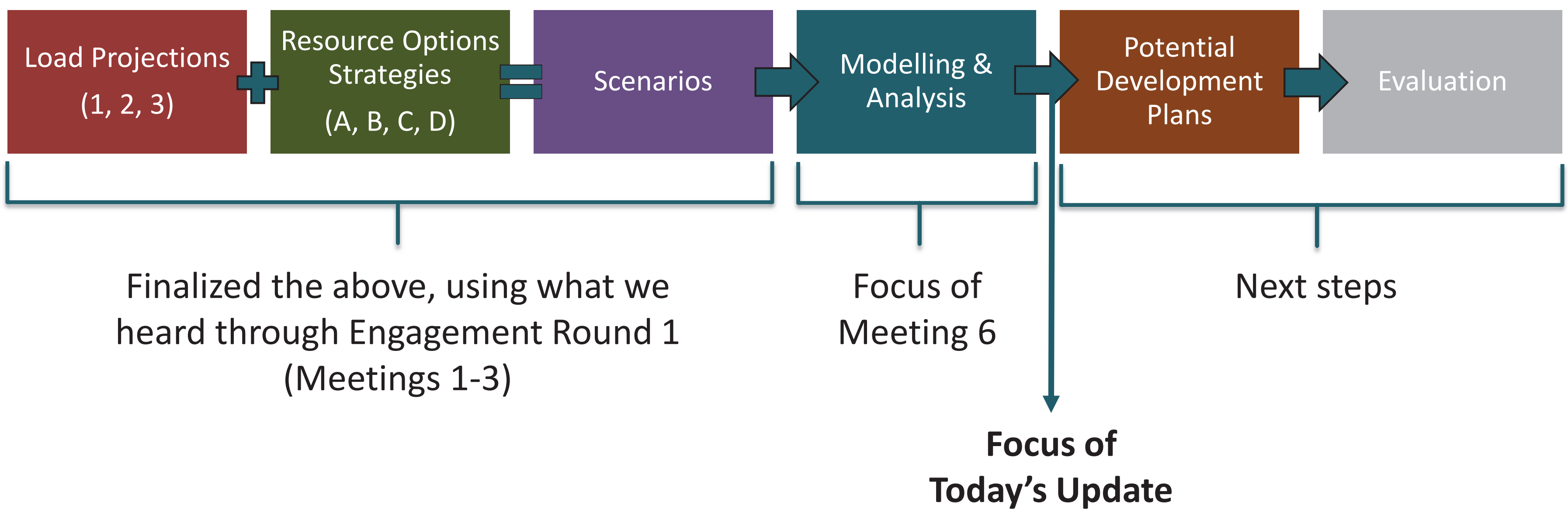
1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan

– we are here



Modelling, analysis, and evaluations

Focusing in on this step in the development process



Two key findings from modelling and analysis

Modelling and Analysis Update

Two key findings have emerged that will help to guide the formulation and evaluation of potential development plans:

- **Six resources are available to meet demand in the 10-year timeframe,** with more options available after 2035. These six resources will form the building blocks of our potential development plans.
- We're narrowing our focus and developing a **load target** for our development plan **(our "build-out target").** While not yet exact, the build-out target will help ensure we're not planning to build too much or too little.
    - It will include a **risk margin** to ensure we consider evolving policy, market conditions and other circumstances.

SIX FEASIBLE RESOURCE OPTIONS

Resource options inventory

Dispatchable & Mature | Intermittent & Mature | Dispatchable & Emerging

- All **resources have different** characteristics such as **cost, emissions, dispatchability, maturity, and time to in-service.**
- **Intermittent/variable energy resources paired with dispatchable resources** can reliably supply customer demand.

"Natural gas" refers to natural gas, synthetic natural gas, and/or biomethane.

Resource options inventory:

Findings indicate that **six resource options** can be added in the next 10 years.

Dispatchable & Mature | Intermittent & Mature | Dispatchable & Emerging

1. Efficiency Manitoba's base plan;
2. Additional energy efficiency programs, demand response, and the curtailable rate program;
3. Wind;
4. Batteries (short-term);
5. Enhancements to existing hydropower;
6. Combustion turbines that can be fuelled by natural gas, synthetic natural gas, and/or biomethane.

<u>**These six feasible resource options will be used to formulate potential development plans.**</u>

Resource options inventory:

Other resources are available, but **only after the 10-year** development plan timeframe.

Resources **not available** to potential development plans for the 2025 IRP include:

- New hydropower;
- Nuclear small modular reactors (SMRs);
- Long term battery storage;
- Combustion turbines fuelled by alternative fuels.

RESOURCES NOT AVAILABLE FOR DEVELOPMENT PLANS TO 2035

A closer look at the resources that **are not included** in the development plan timeframe

New hydropower

Why it's not included: long lead times; high costs

Advantages:

- Very long useful service lives (over 70 years).
- Source of dispatchable capacity; reservoirs provide energy storage.
- Lower operating and maintenance costs.
- Negligible operating greenhouse gas emissions.

Why it's not in the 10-year development plan:

- Long lead times for implementation.
- High up-front capital costs.

Utility-scale solar

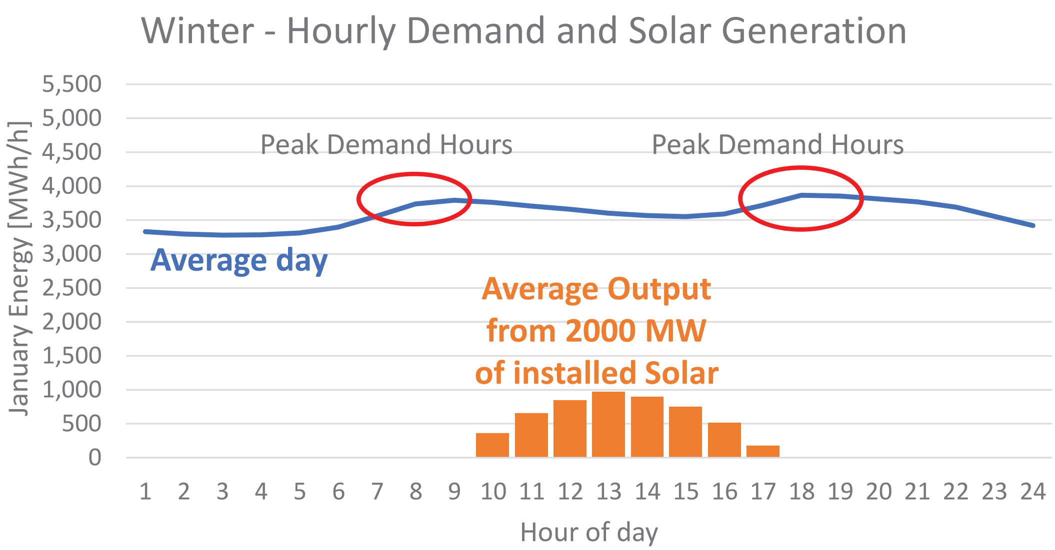
Why it's not included: high variability; zero accredited capacity in winter; inverse relationship with Manitoba load peaks

Advantages:

- Costs projected to decline and no fuel costs.
- Low maintenance.
- Scalable resource; can be located near transmission or load centres.
- Negligible operating GHG emissions.

Why it's not in the 10-year development plan:

- Provides zero accredited winter capacity in Manitoba, often covered in snow.
- Energy production profile does not pair well with Manitoba Hydro's demand.



Nuclear small modular reactors

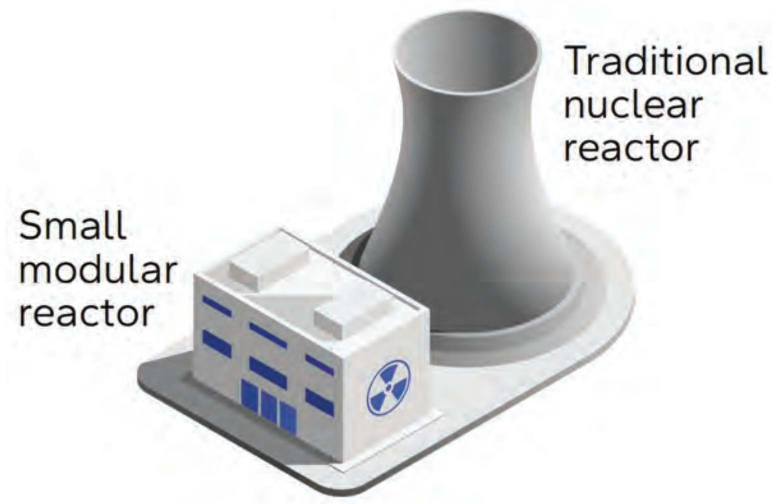
Why it’s not included: high cost; long lead times for regulation

Advantages:

- Reliable baseload power source.
- Negligible operating greenhouse gas emissions.

Why it’s not in the 10-year development plan:

- Long lead times due to regulatory requirements (none yet operational in Canada).
- High costs.



Long-term utility-scale battery storage

Why it's not included: emerging technology with limited market availability

Long-term utility scale battery storage refers to storage that requires a duration of 100 hours or more, as compared to short-term storage which generally assumes 10 hours or less.

Advantages:

- High modularity; dispatchable capacity resource.
- Can be sited strategically.
- Can assist in integrating variable resources.
- Negligible operational GHG emissions.

Why it's not in the 10-year development plan:

- High cost, short asset life.
- Emerging technology with limited market availability.

Alternative fuel turbines and technologies

Why they’re not included: high cost; fuel supply challenges

Advantages:

- Dispatchable resources.
- Alternative fuels and technologies can lower operating GHG emissions.

Why they’re not in the 10-year development plan:

- Limited Manitoba fuel supplies.
- 100% hydrogen turbines are not available in the market for purchase.
- High cost of carbon capture.

Natural Gas Fuelled Combustion Turbine with Carbon Capture

Biodiesel Fuelled Combustion Turbine

Biomass Fuelled Steam Turbine

Biomass Fuelled Steam Turbine with Carbon Capture

Hydrogen Fuelled Combustion Turbine

RESOURCES AVAILABLE FOR DEVELOPMENT PLANS TO 2035

A closer look at the resources that **are included** in the development plan timeframe

Six resource options are included in the development plan timeframe

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

Efficiency Manitoba’s base plan

Why it’s included: Defers the need to build infrastructure; can be low cost and quick to put in service

The base plan (Efficiency Plan Projection) includes projected energy savings from Efficiency Manitoba’s 2025-28 planning analysis extended out to 2050.

Advantages:

- Supports economic development—can involve local businesses and create jobs for Manitobans.
- Can be low-cost, and typically quicker to put in service than utility-scale infrastructure.
- Many are mature technologies / programs.

Limitations:

- Requires customer commitment for uptake of programs, creates uncertainty in adoption rates and timing.
- Limited market potential.

How we heard Manitobans would like 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.

Additional energy efficiency programs

Why it's included: Defers the need to build infrastructure; can be low cost and quick to put in service; potential for economic benefits

Additional energy efficiency programs can include demand response and curtailable rate programs, along with additional programming for home insulation and home and building heating technologies, ground source heat pumps (various programs), and custom energy solutions for industrial applications.

Advantages:

- Programs can be cost-effective alternatives to adding supply.
- Can have shorter implementation times than other resources.
- High potential for Manitoba economy benefits with potential for economic reconciliation.

Limitations:

- Launching new programs can take time to start up and realize potential.
- Market potential is finite; Program participation is customer-driven and voluntary.

Ground source heat pumps (GSHPs): a closer look

Ground source heat pumps show potential, but significant challenges exist

- Manitoba Hydro engaged a third-party consultant to evaluate ground source heat pumps, both individual installations and large-scale installations (i.e. district systems).
- Preliminary results are showing that ground source heat pumps may be economical when compared to high-cost resources with long development times (e.g. hydropower, small modular reactors).

Continuing study & development

Manitoba Hydro is exploring the potential for smaller pilot opportunities for district ground-source heat pumps, including through existing energy efficiency programs.

Feedback is telling us there is interest in:

- Manitoba Hydro evaluating ground source heat pumps alongside other utility-scale resource options.
- Individual buildings systems and district installations that connect multiple buildings.
- How Manitoba Hydro can support larger district installations.

Wind

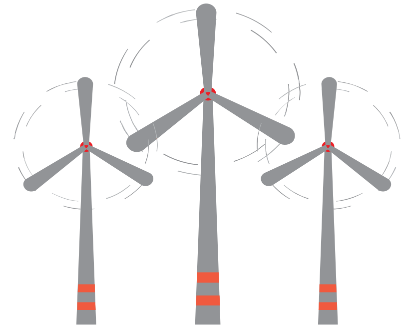
Why it's included: low-cost resource; short construction time; presents economic reconciliation opportunities

Advantages:

- Low-cost electrical energy resource with no fuel costs.
- Relatively short construction time with potential for scaling; can be sited strategically.
- Potential for partnership opportunities and economic reconciliation opportunities for Indigenous Nations.
- Negligible operational GHG emissions.

Limitations:

- Most of the capacity is non-firm—wind is typically accredited at 0-20% of installed capacity.
- Cold weather and wildlife mitigation can limit availability of resource.



Feedback is telling us:

- There is a high level of interest in developing wind energy.

See Manitoba Hydro - Call for power: Indigenous majority-owned wind

Short-term utility-scale battery storage

Why it's included: a modular, dispatchable capacity resource

Short-term utility scale battery storage refers to storage assuming 10 hours or less vs. long-term utility scale battery storage which assumes approximately 100 hours.

Advantages:

- Dispatchable capacity resource.
- Can be sited strategically and is modular.
- Can assist in integrating variable resources.

Limitations:

- High cost, short asset life.
- Can help when energy is plentiful, but not during periods of drought or with cold snaps.

Enhancements to existing hydropower

Why it's included: cost-effective way to add dispatchable power; adds additional firm winter capacity

Advantages:

- Cost-effective.
- Mature technology that provides additional firm winter capacity.
- No facility footprint increases.

Limitations:

- Enhancements take time—most would not be available for the major capacity need date in 2030.
- Primarily adds capacity, with limited energy in some cases.

- It is important to focus on replacing aging infrastructure while also building to accommodate future growth and development.

Natural gas/biomethane fuelled combustion turbines

Why it’s included: low-cost, dispatchable capacity; proven fuel supply; mature, scalable technology

Advantages:

- Can be built to meet capacity needs quickly relative to other options.
- Commercially available, scalable to match load growth, and relatively low cost.
- Adds flexible, dispatchable capacity—quick-start operation ideal for serving peaks.
- Proven, reliable fuel supply (in case of natural gas).
- Option to integrate emerging fuel sources as they become viable.
- Low utilization factor (backstop source) mitigates emissions.

Limitations:

- Emits greenhouse gasses when operating.
- High variable operating costs relative to existing generating resources.
- Biomethane and alternative fuels not yet readily available as a fuel supply in Manitoba.

A closer look at fuels

In all potential development plans, CTs start with natural gas—however, they will be alternative fuel-ready

- **Natural gas** is the combustion turbine fuel **consistently selected by modelling** to 2035.
  - This is due to natural gas' **ready and available supply chain,** which **immediately helps** meet capacity needs.
- **Combustion turbines** fuelled by natural gas will be **capable of being fuelled by hydrogen or other alternative fuels** as those fuels become readily available in Manitoba.
  - It is possible to **operate combustion turbines on biodiesel, biomethane,** and **blends of hydrogen with natural gas.**
  - With some additional investment and further study, it is anticipated that **existing combustion turbines** can be converted to **fully operate on hydrogen** once the technology is commercially available.

Acting now to protect our options

Wind: Issuing Call for Power

- Planning to procure up to 600 megawatts of new majority Indigenous-owned wind energy in southern Manitoba through one or more power purchase agreements.
- Expression of Interest closed July 11 and Request for Proposals to come soon. Details are available on MERX.

Natural Gas/Hydrogen/Alternative Fuel Capable Combustion Turbines: Preparatory Steps

- Taking preparatory steps to reserve a slot in the manufacturing queue and begin preliminary studies.
- No final decision made regarding fuel source. Initially, these dispatchable capacity resources are expected to be fueled by natural gas. In future, it is anticipated combustion turbines will be capable of operating entirely on hydrogen, biodiesel, and/or other alternative fuels.
- Actively exploring offsets and alternative fuels to net-out emissions from any future combustion turbines.

Demand Response / Curtailable Rate Program

- Working closely with Efficiency Manitoba to design and implement programming in the coming months and years.

Enhancing Existing Hydropower: Pursuing Refurbishments

- Currently enhancing Pointe du Bois with eight new generating units. Upgrades will increase the station’s capacity by 52 megawatts and will supply an additional 380 gigawatt-hours per year on average.

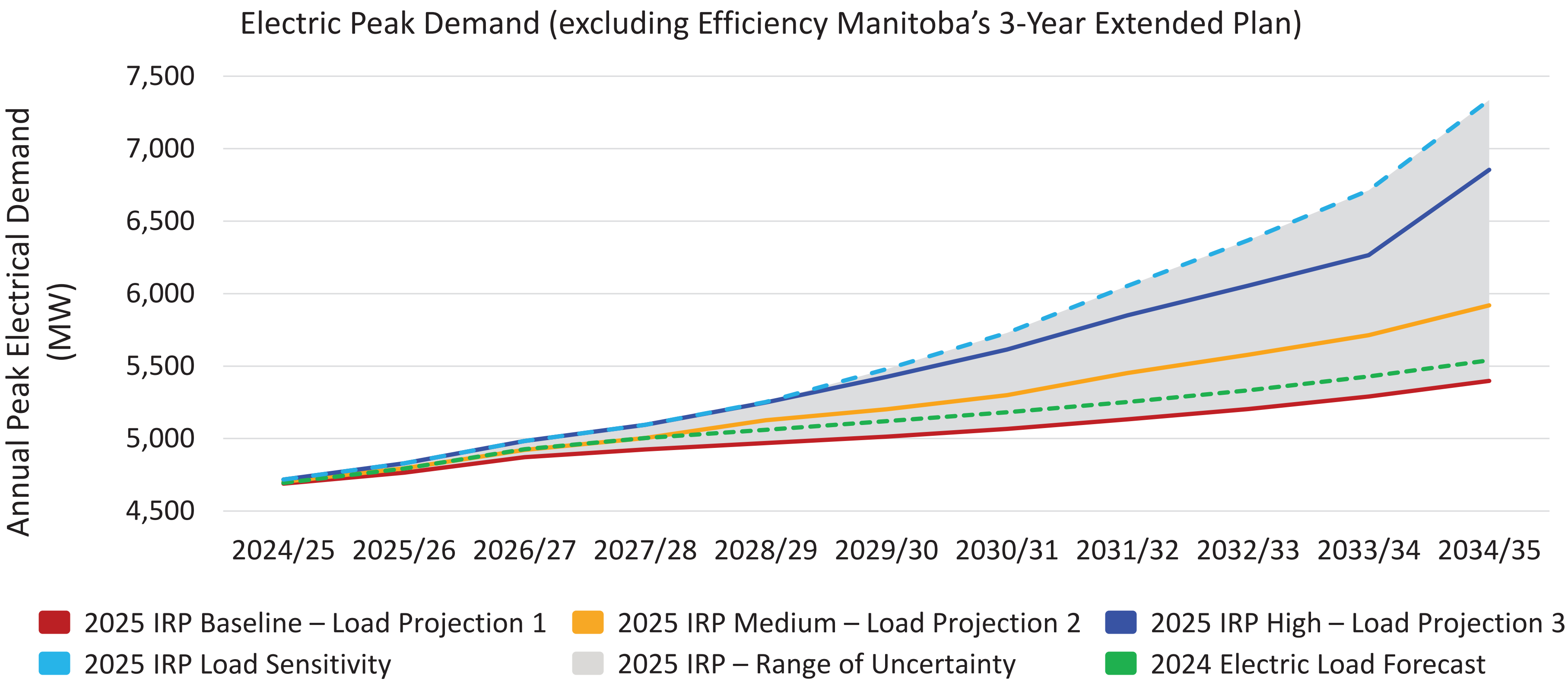
THE BUILD-OUT TARGET: NARROWING OUR FOCUS

What is a build-out target and why do we need one?

- A build-out target establishes a **minimum amount of resources** to allow us flexibility in best serving future needs.
- It helps to **narrow the range of uncertainty** in the analysis of future risks and opportunities.
- It helps to **minimize the risk** of underbuilding or overbuilding for any potential future.
  - The risk of underbuilding is far greater than overbuilding – we can slow down development, but it is very hard to speed up development.

Manitoba's future energy needs

Potential for significant load growth in the next decade, but a lot of uncertainty



Establishing a build-out target

2024 Electric Load Forecast, plus a risk margin

- In the **short term to 2029**, there are currently **insufficient policy instruments** in place that would result in a **load projection above the 2024 Electric Load Forecast**.
- But in the **near-term between 2030 and 2035**, we need **to consider risks and opportunities** beyond the 2024 Electric Load Forecast, such as:
  - **Aging infrastructure** and risks to existing supply;
  - Uncertainty in **load growth**, due to factors like **decarbonization** efforts and **economic development**;
  - **Implementation risks:** we plan to build incrementally and can slow down, but it is not feasible to speed up.
- **Therefore, our build-out target will be the 2024 Electric Load Forecast plus a risk margin.**

Summary and discussion

Summary: two key findings in the 2025 IRP

- Six resources will form the building blocks of our potential development plans.
- The build-out target will include a margin for risk and will land somewhere higher than the 2024 Electric Load Forecast.

Efficiency Manitoba Base Plan

Additional Energy Efficiency Programs

Wind

Enhancements to Existing Hydropower

Batteries

Natural Gas/Biomethane Combustion Turbine

Discussion:

- What's making sense? What's not?
- Are there any surprises or questions on the resource options selected / not selected for the 10 year development plan?
- Of the things we've presented, is there anything you want to understand better?

Next steps

Formulating potential development plans on the way to a recommendation

What comes next in the 2025 IRP process

1. Formulate and evaluate potential development plans to arrive at a short list.
2. Complete financial & risk analyses on the shortlisted development plans.
3. Develop a draft road map, including draft recommended and alternative development plans.

Fall 2025: sharing the draft road map

Feedback on draft road map will be gathered in Round 2

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.

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

To request accessible formats visit hydro.mb.ca/accessibility.

Manitoba Hydro
energy for life

2025 Integrated Resource Plan

Round 2 Engagement – Fall 2025
2025 IRP Road Map

To request accessible formats visit hydro.mb.ca/accessibility.

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Land acknowledgment

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.

Agenda

Purpose:

Share our road map for Manitoba's energy future and hear your insights and feedback.

1. Introduction
2. Road Map: Recommended development plan
   - Break Out Discussion #1
   - Lunch & Share Back
3. Road Map: Learnings, Near-term actions, Signposts
   - Break Out Discussion #2
   - Share Back
4. Next steps and wrap up

Housekeeping

Materials at your tables

Microphones

Washrooms

Guest Wifi

Evacuation procedure

Cell phones

Pictures or Recordings

Purpose of today's engagement

We want to hear your thoughts on our 2025 IRP road map

- **The road map** outlines steps we need to take to ensure we're ready for the energy future.
  - **Share** our **recommended development plan** focused on meeting energy needs over the next **ten years** – provided for awareness and understanding.
  - **Gather your feedback** on how we move forward together on our **near-term actions** to be completed over the next **five years**.
  - Identify any additional **indicators or signposts** that might help identify **changes in the energy landscape**.
- Share next steps that will occur after the IRP is finalized.

Next steps for Technical Advisory Committee

Share, review, and discuss

- **Share 2025 IRP Report & Engagement Report**
  - Reports will unpack the evaluation, financial, and risk analysis used to compare trade-offs and inform the recommendation.
- **Discussion Session (Date: TBD)**
  - Another session will take place to support member understanding of the report materials and recommendations.
  - This session will also be used to gather member input on the engagement process and understand experiences on this new committee as an engagement mechanism in the IRP process.

Introduction

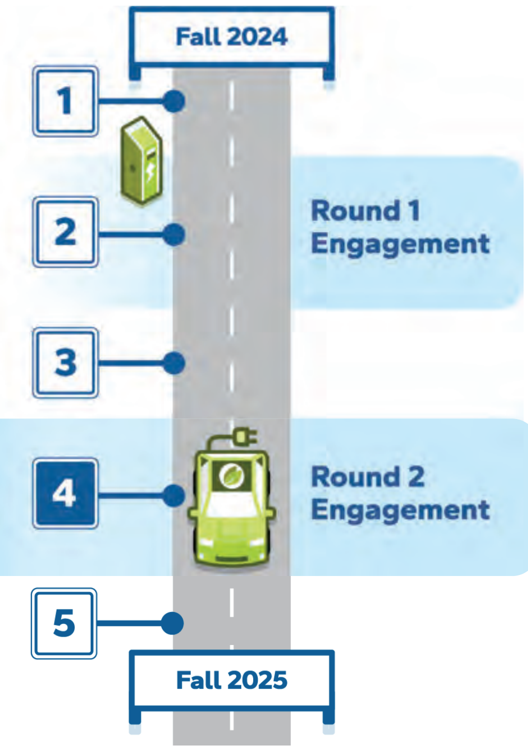
A brief introduction to the 2025 Integrated Resource Plan

The 2025 IRP process

Our journey since fall 2024

– we are here

1. Setting direction
2. Developing key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Making a preliminary recommendation
5. Finalizing the Integrated Resource Plan



Road map

The steps we need to take to ensure we're ready for the energy future

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.

Recommended Development Plan

The Recommended Development Plan:

- Is a high-level plan for the combination and quantity of investments needed to 2035 – **what investments** are needed **by when** and **in what quantities** to meet Manitoba's energy needs;
- Meets requirements for a net-zero grid by 2035 and net-zero economy in Manitoba by 2050.

It is **not**:

- A **standalone strategy for reaching a net-zero economy** in 2050;
- A **commitment to building** any major new facilities;
- A plan with **project-specific details**, like construction locations or timelines;
- A **solution for all Affordable Energy Plan mandates or directives;**
- An **exhaustive list of all investments Manitoba Hydro must make** to effectively serve future energy needs.

Recommended Development Plan meets the 2025 IRP objectives

This 10-year Recommended Development Plan:

- **Meets Manitoba's future energy needs**, including capacity for peak demand and a continuous supply of energy;
- **Considers trade-offs of factors important to Manitobans** – reliability, cost, environmental and socio-economic impacts;
- Provides **flexibility for meeting load growth** and considers risks to new and existing supply;
- **Enables a net-zero grid by 2035 and a pathway to a Manitoba net-zero economy by 2050;** and
- Aligns with Manitoba's **Affordable Energy Plan.**

2025 IRP road map

Recommended Development Plan

$3.4B capital investment to add approx. 1,760 MW accredited capacity by 2035; meets net-zero requirements by 2035; supports a pathway to a net-zero economy by 2050

Resources added under the plan:

- **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*** by 2035;
- **Enhancements to existing hydropower** to achieve a minimum **25 MW** of capacity by 2029;
- **Battery storage of approx. 5 MW** by 2034 to test performance and integration;
- **Natural gas/biomethane fuelled combustion turbines** totalling **750 MW** by 2030.

Capital Investment Cost by 2035: **$3.4B**

Greenhouse Gas Impacts:

- Maintains more than 99.8% **non-fossil-based** electricity generation (on average).
- Compliant with Federal **Clean Electricity Regulations**.

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

Additional non-generation investments, specific to the IRP, to enable resources and future system development:

- **Electrical transmission and distribution upgrades** (not including HVDC or sustainment activities);
- **Gas supply and distribution upgrades** to support new natural gas generation (not including sustainment activities or improvement capital).

Recommended Development Plan

Approx. Accredited capacity (MW) by 2035

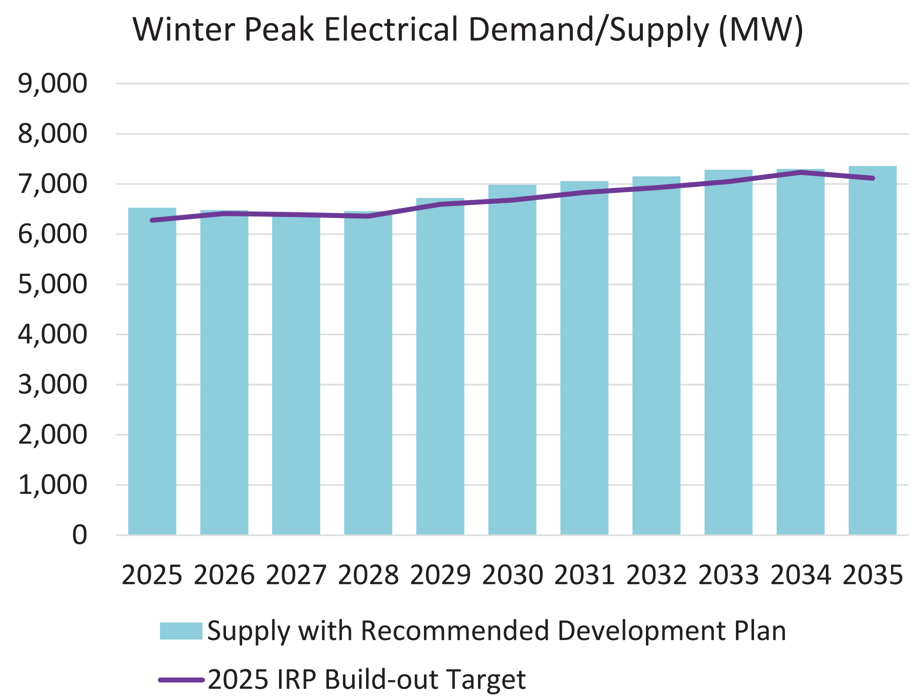
Feasible Resource Options	Recommended Development Plan
Efficiency Plan Projection	450
Demand Response Including Curtailable Rate Program	310
Additional Energy Efficiency Programs	100
Total Customer Side Solutions	860
Wind*	120
Battery Storage	5
Enhancements to Existing Hydropower	25
Combustion Turbine fuelled by Natural Gas/ Biomethane	750
TOTAL	**1 760**

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

- **Efficiency programs, demand response and curtailable rate programs** account for approx. 50% of total accredited capacity.
  - Achieving these resources' capacity goals relies on customer uptake.
- Combustion turbines intended to serve **peak demand** and operate as a backstop during periods of **drought, extreme weather**, or other **system contingencies.**

Manitoba needs to catch up to (and stay ahead of) the energy transition

- Manitoba has a **capacity need date of 2029/30** – limited capacity can be added before this date.
- Established **build-out target and carried out a risk analysis** to ensure reliability. The build-out target mirrors:
  - The 2024 Electric Load Forecast from 2025 to 2029.
  - The 2025 IRP Load Projection 2 from 2029 to 2035.
- The build-out target and risk analysis helps to balance not building enough (inadequate supply) versus building too much (not enough demand).



Recommended Development Plan

Each resource plays a role, and each will be used differently

The following slides outline in brief:

- **How each resource fits** into the recommended development plan—including how they will be used;
- **Key considerations about the resource**.

Energy Efficiency Programs

Includes the efficiency plan projection and additional programs designed to reduce demand for capacity by 450 MW and 100 MW respectively by 2035

How it fits into the plan

- **Reduces demand for capacity**, deferring the capacity we need to serve with other resources.
- **Efficiency-first approach** aligns with Affordable Energy Plan objectives.
- Includes **450 MW of capacity** savings associated with the efficiency plan projection extended to 2035 and introduces **100 MW of additional energy efficiency** programming.

Key considerations

- Achieving reductions requires **voluntary and significant customer uptake**.
- **Efficiency Manitoba needs time** to develop new programming.
- We will need to **monitor performance** of efficiency programming in meeting target demand reductions.

What does the 100 MW of additional energy efficiency programming include?

- Additional home insulation measures;
- Support for ground source heat pump installations;
- Thermal energy storage;
- Custom solutions for industrial customers.

Demand Response and Curtailable Rates Programs

Includes solutions targeting **310 MW** of reduced demand for capacity by 2035

How it fits into the plan

- Helps **reduce the peak capacity** we need to serve.
- **Efficiency-first approach** aligns with Affordable Energy Plan objectives.

Key considerations

- Achieving the reduction in demand for capacity requires **voluntary and sustained customer uptake**.
- Realizing full capacity savings requires **new capabilities, technologies, and tools** (e.g. Distributed Energy Resource Management System [DERMS]; advanced metering infrastructure [AMI, or smart meters]; and new rate structures).
- We will need to **monitor progress** on design, uptake, and effectiveness of programs.

How is Demand Response different from Energy Efficiency Programs?

- Demand Response creates **short duration capacity savings** by reducing peaks.
- Energy efficiency programs provide **overall reductions in energy** use.

Wind

Includes **600 MW** wind power **by 2035**

How it fits into the plan

- Provides **low-cost energy.**
- **Aligns with the Affordable Energy Plan** objective to pursue Indigenous majority-owned wind.
- Provides **opportunities for socioeconomic benefits,** including economic reconciliation.

Key considerations

- Wind's variable nature means it must be **complemented with dispatchable capacity resources.**
- Manitoba Hydro has **conducted and published a high-level wind exploratory study** to inform procurement and eventual interconnection processes within Manitoba Hydro.
- Timelines and project specifics are dependent on procurement processes and project proponents.

Wind's accredited capacity

- Wind is a **variable resource**. Studies have shown up to **20% of installed capacity** will be available during winter peaks.
- This means **600 MW** of installed wind is **accredited at 120 MW**.

See Manitoba Hydro - Call for power: Indigenous majority-owned wind

Enhancements to Existing Hydropower

Includes supply-side enhancements aiming to achieve **25 MW** of capacity by 2029.

How it fits into the plan

- **Adds capacity** with no additional footprint.
- **Aligns with the Affordable Energy Plan** objective to increase capacity through refurbishments.

Key considerations

- There is potential for **up to 180 additional MW** being investigated for economic viability.
- Enhancements will be planned with other maintenance/overhaul work **to maximize economic viability.**

What are Supply-side Enhancements?

- Modifications and/or repowering to existing hydroelectric generating stations that serve to increase capacity.
- For example, Manitoba Hydro's Pointe du Bois Renewable Energy Project that includes replacing/upgrading generating units.

Short-term Utility-scale Battery Storage

Includes battery storage of approx. **5 MW** by 2034

How it fits into the plan

- Provides a source of **dispatchable capacity**.
- Piloting of approx. 5 MW will help **test effectiveness** in Manitoba and help us **understand potential benefits** of future, larger installations.

Key considerations

- Manitoba Hydro **already has significant energy storage** through existing water reservoirs, which may impact the compatibility and benefits of battery storage.
- Batteries **may compete with other resources that reduce peak demand**, like demand response and curtailable rates programs, potentially limiting their usefulness.

Short-term batteries can help with short-term needs

- Providing 10 hours of charge or less, short-duration batteries can help integrate wind and other variable sources.
- Longer-duration batteries are less mature and more costly but would be needed for prolonged events like cold snaps.

Natural Gas*/Biomethane-Fuelled Combustion Turbines

Includes projects totalling **750 MW** by 2030

How it fits into the plan

- Is a **reliable, dispatchable capacity resource** ideal for **serving peak demand**.
- Three units of approx. 250 MW each provide **enough capacity to meet current and future firm demand** requirements until 2035.
- Meant for **year-round reliability—not every-day energy**.

Key considerations

- Manitoba Hydro must **maintain a minimum level of capacity** to ensure reliability.
- As they are in high demand globally, Manitoba Hydro is proactively **securing manufacturing slots** to maintain our place in the procurement queue.
- Any combustion turbines will have the option to **run on renewable fuels** as they become available.

*"Natural gas" refers to natural gas, synthetic natural gas, and/or biomethane.

Emissions impacts

- Based on current system planning and modelling, any combustion turbine is expected to operate infrequently – primarily to serve peak demand and as a backstop during periods of drought, extreme weather, or during other system contingencies.
- Running combustion turbines fuelled by natural gas/biomethane at the modelled frequency would have very little impact on Manitoba's emissions.

Why 750 MW of Natural Gas Combustion Turbines?

Creates contingency critical for reliability and much more for our province

1. **It supports reliability**
   - Enables integration of intermittent renewables such as wind and helps mitigates risks like aging HVDC infrastructure.
   - Allows for consistent service of existing system even during droughts, extreme weather, or other system challenges.

2. **It's cost-effective**
   - Plans with fewer combustion turbines are more expensive.
   - After maximizing energy efficiency and demand response, combustion turbines are the lowest-cost dispatchable resource.

3. **It contributes to decarbonization and economic growth**
   - Combustion turbines are a key part of the recommended development plan that supports Manitoba's transition to a net-zero economy by 2050 and additional economic development opportunities.

4. **It can be deployed quickly**
   - Combustion turbines can be built and deployed to provide capacity needed as soon as 2030.

Alternative Development Plan

Lower cost but offers fewer socio-economic benefits than recommended development plan; includes more wind, more CTs, and less efficiency programming

Feasible Resource Options	Recommended Development Plan	Alternative Development Plan
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
Wind*	120	140
Battery Storage	5	5
Enhancements to Existing Hydropower	25	0
Combustion Turbine fuelled by Natural Gas/Biomethane	750	850
TOTAL	**1 760**	**1 760**

*120 MW of accredited capacity of wind is equivalent to 600 MW of installed wind; 140 MW accredited is equivalent to 700 MW installed

Why we recommend this development plan

The recommended plan offers:

- A **lower overall risk profile**;
- A **better balance** between factors important to Manitobans, offering **greater opportunities for socio-economic benefits** than offered by the alternative development plan;
- Among the **lowest cost plans;**
- Better **alignment with government directives** for Manitoba Hydro, including more energy efficiency programming and enhancements to existing hydropower assets.

Breakout Discussion #1 – 30 minutes

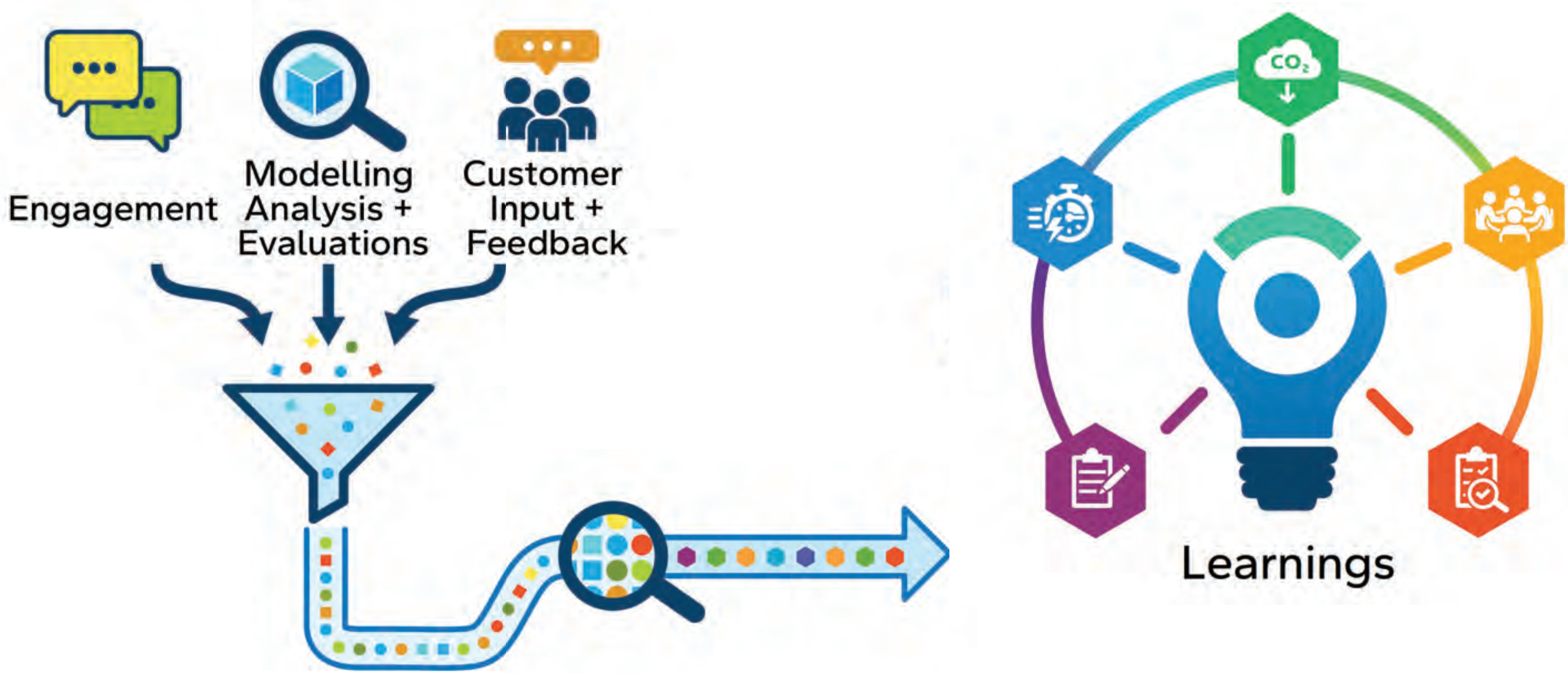
Guiding Questions

- What are your initial impressions of the recommended development plan?
- Is there anything you want to understand better?
- Do you have any additional questions or comments?

Breakout Discussion #1 – Share Back

- Lunch is served!
- Choose a member from your group to share back
- Share 2-3 highlights from your discussion

What are learnings?



Learnings

Key takeaways from the process

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 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 2029/30 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.

Near-term Actions (NTAs)

To be completed over the next 5 years

Near-term actions 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.

There are two NTA themes:

Theme 1: Implement the development plan.

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

NTA 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.
5. Implement the **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.

NTA Theme 2: Prepare for the next IRP and continue ongoing planning

8. Monitor the **development plan implementation and load growth** to guide resource adjustments (e.g., tracking energy efficiency, resource project schedules, and supply-demand balance).
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.

Manitoba Hydro supports the energy transition

To support the NTAs and ongoing planning, we will…

- Continue to **build alignment** with the Province of Manitoba, Efficiency Manitoba, the Public Utilities Board, customers and Interested Parties.
- **Provide information and analysis** to support policy decisions, including supporting a vision for Manitoba Hydro's role in a net-zero future.
- **Continue to communicate** with Interested Parties to **share outcomes and learnings** from the 2025 IRP.
- **Provide resources and information** to allow customers to make **informed energy choices** that support a managed energy transition.
- **Support the advancement of economic reconciliation** in our interactions with Indigenous peoples and nations.

What are Signposts?

Signposts:

- Indicate the type, timing, pace, and magnitude of change in the energy landscape.
- Inform implementation of near-term actions and development plans.
- Will be monitored, reported on, and incorporated into IRP analysis to understand when changes to underlying IRP assumptions are significant enough to warrant another IRP.
- Reflect many things that will be monitored for risk of implementing the development plan.

Signposts

How we recognize change in the energy landscape

We identified three signposts as having the largest impact on the demand and supply of energy.

Breakout Discussion #2 – 30 minutes

Guiding Questions

- Do you have questions or comments on the learnings, near term actions or signposts?
- Are there any near-term actions that you are particularly interested in?
- How could your organization/sector contribute to these near-term actions?

Breakout Discussion #2 – Share Back

- Share 2-3 actions and opportunities for collaboration that rose to the top in your group's discussion

Next steps

Next Steps for the 2025 IRP and Beyond

For the 2025 IRP:

- Complete Round 2 Engagement and share what we heard.
- Finalize and submit 2025 IRP to Government for approval.
- Anticipate government will refer the 2025 IRP and the recommended development plan to PUB for review.
- Implement development plan.
- Pursue project-specific approvals, as appropriate. (e.g., some projects may require a *Major New Facilities Review* by the Public Utilities Board, or review under the *Environment Act*.)

Beyond the 2025 IRP:

- Execute near-term actions.
- Monitor landscape, especially signposts.
- Update IRP analysis in between IRPs.
- Continue conversations with the energy planning community.
- Prepare for the next IRP – likely to launch within three years.

Thank you!

Hydro.mb.ca/future

Email us at: IRP@hydro.mb.ca

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Manitoba Hydro
energy for life

6.5. TAC Meeting Summaries

Summaries from the following meetings are included in this section:

- **Meeting #1 - November 8, 2024**
  Welcome and introduction to the 2025 Integrated Resource Plan.
- **Meeting # 2 - November 21, 2024**
  Load projections, greenhouse gas emissions and resource options inventory.
- **Meeting #3 – December 2, 2024**
  Modelling, analysis, and evaluation.
- **Meeting #4 – January 31, 2025**
  Supplemental Session - Key concepts of energy planning.
- **Meeting #5 – Meeting cancelled, therefore no summary provided.**
- **Meeting #6 - April 7, 2025**
  Preliminary modelling and analysis results.
- **Meeting #7 - July 17, 2025**
  Project Information Session - Interim Update

A summary for the following will be provided in supplemental reporting:

- **Meeting #8 – December 9, 2025**
  2025 IRP Road Map

Manitoba Hydro 2025 Integrated Resource Plan	Technical Advisory Committee Meeting #1 Summary Notes

Purpose of Notes:

Meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. How Manitoba Hydro takes action on this feedback, is considered along with input from other engagement conversations throughout the 2025 Integrated Resource Plan process. The outcomes of engagement and any actions taken are published following each engagement round in a "What We Heard" document and the Engagement Report with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date: November 8, 2024 – 10:00am-1:00pm

Location: Manitoba Hydro Place - 360 Portage Avenue, Winnipeg, MB

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair - Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Eco-West/Éco-Ouest Canada – Dany Robidoux Efficiency Manitoba - Colleen Kuruluk Government of Manitoba – David Scammel Government of Manitoba – Teody Leano Manitoba Chamber of Commerce - Green Advantage – Christa Rust Manitoba Keewatinowi Okimakanak Inc. – Anita Murdock Manitoba Métis Federation – Marci Riel Red River College – Jose (Jojo) Delos Reyes Public Utilities Board - Brady Ryall University of Manitoba – Cameron Whitton
Supporting attendees:	Manitoba Hydro – Adam Marcynuk Manitoba Hydro – Diana Mager Manitoba Hydro – Jennifer Danowski Manitoba Hydro – Jennifer Korotkov Manitoba Hydro – Kathy Allard Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Meeting Facilitator - Maggie Bratland

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	Manitoba Hydro – Shoni Madden Consultant – Urban Systems - Ryan Segal Consultant – Urban Systems - Kayla Dawson Consultant – Urban Systems - Hannah Patton
Regrets:	Association of Manitoba Municipalities – Duane Nicol Sustainable Building Manitoba - Laura Tyler
Meeting Materials:	Draft Committee Terms of Reference List of Invited Members Copy of Meeting Presentation Signpost Update

Meeting Agenda:

1. Welcome & Land Acknowledgement
2. Session Overview & Committee Introductions
3. Introduction to the 2025 IRP
4. Engagement Approach
5. Draft Committee Terms of Reference
6. Signpost Update
   Break / Lunch
7. 2025 IRP Step 2: Develop Key Inputs & Scenarios
8. Load Projections
9. Resource Options Strategies
10. Scenarios
11. Evaluation Metrics
12. Next Steps

Engagement Approach:

Slides: 14-22

- **Public Survey:** TAC members noted appreciation for a holistic survey sent to rate payers and felt survey had a good variety of questions compared to previous surveys.

Q: Many communities have Energy and Emissions plans. Can these plans be incorporated?

- **Engagement Strategy & Signpost Monitoring:** Part of the engagement strategy is understanding more about the plans municipalities have. This includes understanding municipalities' potential long-term energy needs and plans (as energy users and a governing body) including potential changes in policy and decisions that may impact energy types and sources. These are also a key indicator we monitor in our signposts.

Draft Terms of Reference

Slides: 23-30

Section – Purpose

- **Committee Input and Feedback:** There was a discussion about the type of input and feedback that would be sought from committee members. Manitoba Hydro clarified that the committee's role is to provide feedback and input to inform key aspects of the 2025 Integrated Resource Plan (IRP) development process, but they will not be recommending a development plan.
- **Clarification of Participation:** Committee members discussed the need to clarify whether they are contributing their personal expertise or representing their organizations. The effort involved for TAC members was acknowledged, and Manitoba Hydro will consider this feedback further.
- **Purpose of the Committee:** TAC members suggested that the purpose of the committee should be clarified, specifically whether it is an engagement effort or considered Crown Consultation. Manitoba Hydro noted that the purpose of the TAC is engagement and that it would be clarified within the final Terms of Reference that TAC meetings are not Crown Consultation.

Section - Membership Criteria

- **Expectations of TAC Members:** Participants discussed the need to clarify whether TAC members are expected to bring individual expertise or represent and gather information from their organizations. The criteria for participation depend on whether members are representing individuals or organizations, and it is necessary to clarify if the expectation is for a representative or collective perspective.
- **Impact on Organizations:** There was a discussion about how participants' organizations might be affected by energy planning. It was noted that the effects of the Integrated Resource Plan (IRP) on organizations and communities might be overlooked.
- **Text Adjustments:** Proposed adjustments to the text included changing the word "aids" to "impacts."

Section - Responsibility of Members

- **Adjustments to Formatting:** Participants suggested changes to the formatting to highlight active participation and the creation of a safe space for sharing perspectives.
- **Acknowledging Limitations:** There was a discussion emphasizing the importance of recognizing that not all committee members can comment. It is important to acknowledge that some participants may abstain from commenting due to their limitations.

Section - Responsibility of Manitoba Hydro

- **Clarification:** Bullet 4 mentions "where appropriate," and there was a request to clarify this. It was explained that some feedback might not be included in the Integrated Resource Plan (IRP) but could be used in other parts of ongoing energy planning at Manitoba Hydro or other planning studies.
- **Conduct:** It was noted that the Manitoba Hydro conduct should mirror member conduct.

Section - Committee Feedback

- **Objectives and Constraints:** The objectives must be clearly defined, along with the constraints under which the IRP operates. Manitoba Hydro shared the overall objective is a long-term plan to 2050, and a more specific recommended development plan that covers the next ~10 years.
- **Documenting Committee Feedback:** A meeting summary of TAC feedback will be shared publicly on the Manitoba Hydro 2025 IRP website. It was clarified that TAC member feedback will be documented in meeting notes as part of the engagement report. The outcomes from engagement will be published following each engagement round in a "What We Heard" document on the 2025 IRP website, as well as in the Engagement Report published with the 2025 Integrated Resource Plan.
- **Attributing Member Feedback:** Feedback will be summarized on topics and no questions or comments will be specifically attributed to organizations or individuals. Participants know they should communicate if they would specifically like a comment noted or attributed to their organization by the note takers. Manitoba Hydro will adapt the text to clarify the meaning. The meeting notes and engagement report would list the TAC member organization and name publicly.

Signpost Update

Slides: 31-35

- **Signpost Update:** The signpost update is shared with the committee mainly for informational purposes. The TAC can provide feedback on whether Manitoba Hydro is missing any key indicators or if there are gaps in the monitoring process for energy planning.
- **High-Level Starting Point:** The signposts can be described as indicators that inform on the timing, pace, magnitude or type of changes happening in the energy landscape. By reading these signposts, we can identify trends to anticipate and better understand when and how things are changing. The signposts serve as a high-level starting point, and the information from them will be translated into key inputs for the Integrated Resource Plan (IRP).

Q: Are the Federal Clean Electricity regulations still in draft?

The Regulation is expected to be enacted before end of year (2024) and will be considered when determining resource options.

Q: How do overall transportation mode shifts play a role beyond electrifying vehicles? What are the indicators for these modal shifts in transportation?

This could fall under government actions or customer decisions. Manitoba Hydro will be monitoring these developments and if we see a trajectory of change, that would be built into the data that informs the IRP's key inputs and scenarios.

Load Projections

Slides: 41-47

- **Development of Planning Assumptions:** The committee discussed the planning assumptions included in the projections, including seeking feedback on how alternatives such as ground source heat pumps and district heating systems are considered. Manitoba Hydro presented the preliminary assumptions and noted the inclusion of ground source heat pumps. The preliminary projections were developed recognizing there are many different pathways to net-zero. It was noted that a dedicated and continued discussion on the load projections was planned for the second TAC meeting.
- **Baseline Projection:** The committee asked questions around how policy was incorporated and what was considered within the baseline projection. Manitoba Hydro shared that IRP considers policy from all levels of government, such as federal, provincial, and municipal. The baseline load projection assumes lower economic growth and that there is little change from what Manitobans are currently doing today, where customers continue to select the most economic decisions when it comes to their energy needs. The load projections will be paired with a range of resource options strategies to consider the impacts of energy policy on the resource options available for modelling & analysis.
- **Demographics:** The committee discussed how different demographics and regional considerations are incorporated into the load projections. It was clarified that the load projections are displayed as an entire provincial load based on averages, rather than higher and lower end users or different demographics. This includes northern Manitoba end users' data which is aggregated in the total averages with the exception of off-grid communities which are not included within the load projections shown.
- **Energy Efficiency:** Discussion was held around how energy efficiency is incorporated as part of the load projections. It was shared that electricity and natural gas savings achieved through Efficiency Manitoba's programming is being considered in two ways in the 2025 IRP. Efficiency Manitoba provided Manitoba Hydro with a long-term projection of electric and natural gas savings, based on its current Energy Efficiency

Plan to achieve their legislated targets. This forecast of electric and natural gas savings was subtracted from the load forecasts of all IRP scenarios. Efficiency Manitoba also identified the energy efficiency groupings it could focus on to advance or achieve more energy savings than identified in its long-term projection of savings. This extra energy efficiency potential was estimated based on a market potential study. In select sensitivities, the model can select these extra energy efficiency groupings along-side other resource options.

- **Achieving Absolute Zero:** There was a discussion about the load projections showing only a 50% decrease in natural gas usage, not reaching absolute zero emissions by 2050, with carbon extraction methods like direct air capture being considered after 2050. It was shared that the IRP objectives and goals need to be outlined clearly. Manitoba Hydro clarified that the objective within the 2025 IRP is to study net-zero economy by 2050 and that absolute zero is not the objective.
- **Provincial Emissions Overview:** Looking at a provincial emissions summary by source, it was clarified that the 0.140 Mt (1%) of Manitoba emissions attributed to Manitoba Hydro includes all operating emissions, including generation. This included discussion around how provincial emissions represent customers energy related choices, such as the stationary combustion category including the natural gas and propane used by customers for heating and cooking. Some members noted that Manitoba Hydro's Integrated Resource Plan (IRP) should prioritize a focus on emission sources like transportation and stationary combustion over those such as agriculture. It was noted that part of Manitoba Hydro's mandate is to identify a plan to align with the governments focus on a net-zero economy by 2050 – so the 2025 IRP includes a focus on where Manitoba Hydro can support in reducing emissions.

Q: If a policy came in in 2030 that said no new natural gas connections permitted, what does that do to load projections?

The high load projection assumes that in 2030 all new homes/commercial customers cannot install new natural gas connections, and that post 2035 all failing heating systems must be replaced by an alternative to natural gas. The load projections are paired with resource options strategies that can further enable the 2025 IRP to consider the impacts of energy policy implications such as fuel restrictions.

Resource Option Strategies

Slides:48-53

- **Strategy D & Potential for non-emitting hydrogen:** There was a group discussion around the assumed restrictions in strategy D and the fact it removed non-emitting hydrogen as a potential fuel. Manitoba Hydro shared that the 2025 IRP resource options strategies aim to capture a broad range (large bookends), and the goal is to consider a range of policy restrictions that have the potential to impact available resources that can be selected.

Scenarios

Slides: 54-60

- **Beyond economic considerations:** There was a discussion around the sensitivities being focused on economic considerations and how the 2025 IRP will consider other aspects such as economic reconciliation. It was noted these broader considerations are part of the evaluation step in the process.

Evaluation Metrics

Slides: 61-69

- **Opinion Polls:** TAC members mentioned that the Consumers Coalition has conducted opinion polls, which could be used to inform evaluation metrics.
- **Cost Distribution:** There was a discussion about the costs of energy needs not being solely borne by ratepayers. It was suggested that taxpayers should also contribute. Manitoba Hydro acknowledged this and will consider the possibility of taxpayer support and other revenue sources as part of the evaluation.

Next Steps

Slides: 70-72

- **Next Steps:** Committee members were informed that the meeting's feedback will be considered, and proposed adjustments to the Terms of Reference will be shared at the next meeting.
- **Feedback from Absent Members:** Manitoba Hydro will reach out to members who couldn't attend to provide an opportunity to share feedback on the draft Terms of Reference.
- **Meeting Times:** It was confirmed that the current meeting times work for everyone, so they will remain unchanged. Manitoba Hydro emphasized the importance of building relationships and supporting dialogue in an in-person environment, hence no virtual links were provided.
- **Sharing Materials:** It was identified that Manitoba Hydro will aim to share meeting materials for review three business days ahead of scheduled meetings.

Manitoba Hydro 2025 Integrated Resource Plan

Technical Advisory Committee Meeting #2 Summary Notes

Purpose of Notes:

Meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. How Manitoba Hydro takes action on this feedback, is considered along with input from other engagement conversations throughout the 2025 Integrated Resource Plan process. The outcomes of engagement and any actions taken are published following each engagement round in a "What We Heard" document and the Engagement Report with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date: November 21, 2024 – 11:00am-2:00pm

Location: Manitoba Hydro Place - 360 Portage Avenue, Winnipeg, MB

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair - Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Eco-Ouest Canada – Dany Robidoux Efficiency Manitoba – Michael Stocki Government of Manitoba – David Scammel Government of Manitoba – Teody Leano Manitoba Chamber of Commerce – Green Advantage – Christa Rust Manitoba Keewatinowi Okimakanak Inc. – Anita Murdock Manitoba Métis Federation – Christian Goulet Red River College – Jose (Jojo) Delos Reyes Public Utilities Board – Brady Ryall University of Manitoba – Cameron Whitton Association of Manitoba Municipalities – Duane Nicol Sustainable Building Manitoba – Laura Tyler Manitoba Sustainable Energy Association - Wayne Clayton Manitoba Industrial Power Users Group - Dale Friesen Consumers Coalition of Manitoba - Peggy Barker
Supporting attendees:	Manitoba Hydro – Adam Marcynuk Manitoba Hydro – Andrew Greaves Manitoba Hydro – Diana Mager

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	Manitoba Hydro – Jennifer Danowski Manitoba Hydro – Kathy Allard Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Shoni Madden Consultant – Urban Systems - Ryan Segal Consultant – Urban Systems - Kayla Dawson Consultant – Urban Systems - Hannah Patton
Regrets:	None
Meeting Materials:	Meeting #2 Supporting Materials – Background on Load Projections, Greenhouse Gas Emissions, and Resource Options Inventory (distributed via email prior to meeting) Copy of Meeting Presentation Breakout Activity Workbooks

Meeting Agenda:

1. Introductions
2. Updates from TAC Meeting #1
3. Terms of Reference Updates
4. Proposed Load Projections - Guiding Principles and Development Approach
5. Proposed Load Projections - Planning Assumptions
6. Breakout Activity
7. Resources Options Inventory & Proposed Strategies
8. Next Steps

Introductions and Updates

Slides: 1 - 18

- **Meeting Overview and Purpose:** The chair noted that all information presented at the TAC is proposed and open for discussion and feedback. The information may evolve as it is finalized to incorporate feedback heard through engagement. The chair noted that the focus of TAC Meeting #2 is to inform and engage on Load Projections and to inform the TAC about the Resource Options Strategies.
- **Terms of Reference:** The chair provided an update on the proposed adjustments to the Terms of Reference. A final version of the Terms of Reference will be distributed following the meeting.

Proposed Load Projections

Slides: 19 - 28

Planning Assumptions

- **Guiding Principles:** Details were provided on the guiding principles used to develop the load projections, including key assumptions made to understand what the potential electrical and natural gas demand would be in Manitoba under a "net-zero economy" by 2050. Three load projections were developed and are intended to capture a broad range of potential futures for both electricity and natural gas. The load projections assumptions leverage key learnings from the 2023 IRP. Consideration will be made to limit the premature removal of existing systems that have not reached end of life. Load projections two and three will explore achieving a net-zero economy by 2050 through different pathways.

- **GHG Emissions:** Details were provided on the current understanding of GHG emissions in Manitoba and the impact to electrical and natural gas loads depending on GHG reduction options selected. It was noted that instead of reducing emissions, there is also the option to net-out emissions with removal technologies. Members sought clarification on which components of Manitoba's GHG emissions Manitoba Hydro had influence over as part of the IRP process. Clarification was sought on whether fugitive energy emissions, agriculture, natural gas sales, and off-grid emissions were considered in the GHG pie chart, and whether GHG projections assume that Manitoba Hydro will rely on offsets.

Load Projections

- The difference in key planning assumptions for each load projection were reviewed, and the methodology for how the load projections would be modelled was shared.
- **Direct Air Capture:** Members expressed concern about the assumptions for extraction methods like direct air capture not being considered until 2049/50, and also noted concerns about the readiness of those technologies. Clarification was sought on whether carbon capture energy use was for all Provincial emissions or just Manitoba Hydro combustion emissions. It was suggested to specifically explore the addition of future scenarios where all fossil fuels are removed.
- **Policy Influence:** Members asked how and if these key planning assumptions would both respond to and influence policy. It was noted that Manitoba Hydro does not have jurisdiction to author policy, but the IRP is informed by policy made or considered by all levels of government. Members shared that feedback on the IRP and analysis results could help provide further information and data to help inform policy decision-makers.
- **Key Planning Assumptions:** Further detail was provided on the key planning assumptions informing the load projections, and the annual electrical energy, peak electrical demand, natural gas consumption and energy efficiency projections to 2049/50. A high-level overview of the assumptions and forecasts for the electrification of transportation, space heating, customer self-generation & storage, industrial decarbonization, and direct carbon capture were shared prior to being explored further in the Breakout Activity.
- **Additional Clarifications:** Clarification was also sought on whether projections consider consumer behavioral changes, population changes and shifts in heating due

to a warming climate, and which coefficient of performance was used in industrial fuel switching assumptions.

- **Breakout Activity:** A Breakout Activity was facilitated with members to seek additional feedback on key planning assumptions for the electrification of transportation, space heating, customer self-generation & storage, industrial decarbonization, and direct carbon capture. Feedback was sought on whether a broad enough range was considered in the three load projections and to understand the factors that could impact the load projections. Five stations were set up with a notetaker/facilitator and subject matter expert to discuss. An additional station to capture other questions and feedback was also available. Members were invited to move around to each station to provide input or to provide written input in a breakout activity workbook.

Resource Options Inventory and Proposed Strategies

- Based on feedback from TAC members, this section of the presentation was deferred to a future TAC meeting to allow for further discussion about net-zero economy by 2050. This section was subsequently recorded and distributed via email to TAC members prior to TAC Meeting #3.

Net-Zero Economy

- Based on conversation from earlier in the meeting and discussions during the Breakout Activity, the chair suggested having a further discussion with members about net-zero economy. Members were polled to confirm they were comfortable with the change to the agenda.
- **Net-Zero Economy:** The chair noted that Manitoba Hydro's mandate letter from December 2023 included a request to align with the government's objectives of a net-zero economy by 2050. The 2025 IRP is exploring this request to consider the energy needs that might be required to power the decisions and technologies for all emissions reductions in the economy – beyond energy related greenhouse gas emissions. Members indicated that this clarification is important and that further clarification of Manitoba Hydro's role in the net-zero economy and relationship to other provincial policy should be provided in subsequent meetings and other IRP communications. Members suggested that the IRP should consider a fourth load projection that includes absolute zero emissions for all emissions from the space heating and transportation sectors.

Next Steps

Slides: 65 - 67

- Members were informed that today's feedback will be considered and proposed adjustments would be shared in subsequent meetings.

Manitoba Hydro 2025 Integrated Resource Plan	Technical Advisory Committee Meeting #3 Summary Notes

Purpose of Notes:

Meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. How Manitoba Hydro takes action on this feedback, is considered along with input from other engagement conversations throughout the 2025 Integrated Resource Plan process. The outcomes of engagement and any actions taken are published following each engagement round in a "What We Heard" document and the Engagement Report with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date: December 2, 2024 – 10:00am-1:00pm

Location: Manitoba Hydro Place - 360 Portage Avenue, Winnipeg, MB

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair– Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Eco-West/Éco-Ouest Canada – Dany Robidoux Efficiency Manitoba – Michael Stocki Government of Manitoba – David Scammel Government of Manitoba – Teody Leano Manitoba Chamber of Commerce – Green Advantage – Christa Rust Manitoba Keewatinowi Okimakanak Inc. – Anita Murdock Manitoba Métis Federation – Christian Goulet Red River College – Jose (Jojo) Delos Reyes Public Utilities Board – Brady Ryall University of Manitoba – Cameron Whitton Association of Manitoba Municipalities – Duane Nicol Sustainable Building Manitoba – Laura Tyler Manitoba Sustainable Energy Association – Wayne Clayton Manitoba Industrial Power Users Group – Dale Friesen Consumers Council of Canada – Peggy Barker
Supporting attendees:	Manitoba Hydro – Adam Marcynuk Manitoba Hydro – Andrew Greaves Manitoba Hydro – Diana Mager

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	Manitoba Hydro – Kathy Allard Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Shoni Madden Consultant – Urban Systems – Ryan Segal Consultant – Urban Systems - Kayla Dawson Consultant – Urban Systems - Hannah Patton
Regrets:	None
Meeting Materials:	Final Copy Terms of Reference, Recorded Presentation Video – Resource Options Strategies, Member Check-in Survey, Meeting Agenda (Distributed via email prior to meeting) Copy of Meeting Presentation Breakout Activity Workbooks

Meeting Agenda:

1. Introductions and updates from meeting #2
2. Resources Options Inventory & Proposed Strategies – Questions and Feedback
3. Modelling and Analysis
4. Evaluation
5. Breakout Activity
6. Next Steps

Introductions and updates from meeting #2

Slides: 1 - 7

- **Meeting Overview and Purpose:** An overview of the meeting agenda and purpose was provided. The chair noted that all information presented is proposed and open for discussion and feedback. The information may evolve as it is finalized to incorporate feedback heard through engagement. The chair noted that the focus of meeting #3 is to inform on the modelling & analysis approach, and to both inform & engage them on the evaluation process and metrics.
- **Meeting Format and Activities:** Members were asked to share feedback and reflections on the group structure and meetings to date. Members shared their appreciation for the opportunity to have breakout activities and enjoyed hearing from one another's perspectives at meeting #2. There was a question asked about the use of Menti polls during the virtual interested parties engagement sessions as the results could potentially be skewed if participants answered multiple times at separate sessions. It was shared that the polls were intended to stimulate discussion and to provide multiple mechanisms for individuals to share input during the virtual sessions and that there was not a high concern related to skewing of results.

- **Net-Zero Considerations:** Members noted that adjusting the agenda during TAC Meeting #2 to further discuss "net-zero economy" was appreciated. There was interest in learning more about the planning assumptions for direct air carbon capture. The breakdown of the load scenarios and the discussion of future uncertainty beyond ten years was appreciated. It was noted that Manitoban municipalities often face challenges in attracting Federal funding support for net-zero projects due to its already low-carbon energy grid.
- **Scope of IRP:** There was a desire to further understand the scope and boundaries of the IRP when it comes to the analysis outputs both incorporating policy and the potential to influence policy development. Members sought clarification on the difference between a plan developed by the Province to achieve a net-zero economy, and Manitoba Hydro's IRP analysis that explores the energy needed to serve a net-zero economy.
- **Policy and the IRP:** Concerns were raised about how the IRP may shape policy makers' and the public's views on attainability, particularly with the three load scenarios. It was shared that the load projections do not represent a future path that Manitoba Hydro will implement, rather the projections represent potential customer decisions and the resulting future demand that Manitoba Hydro may need to serve. The three load projections enable the IRP analysis to consider a broad range of potential future energy needs including a net-zero grid by 2035 and a net-zero economy by 2050.
- **Meeting Materials:** The pre-meeting materials were well received, but additional time is needed for review prior to the meeting. Members noted that there is a lot of information being shared at the meetings and that while members appreciate the effort to share the process, it may be important for future meetings to prioritize key content where feedback from participants is needed. This would help to avoid overwhelming participants.

Resource Options Inventory & Proposed Resource Options Strategies

Slides: 10 - 18

- An opportunity was provided for members to share feedback and ask questions on the pre-recorded video on resources options inventory and proposed strategies distributed prior to the meeting.
- **Terminology:** Members noted a need for clarity on some terminology used during the presentation, including: energy, capacity, dispatchability, and net-zero. It was suggested that this terminology should be shared in future meetings and public materials.

- **Information Requested:** More information was requested on emissions forecasts associated with each load projection as well as the "hockey stick" in the medium and high load projections.
- **Resource Options Inventory**: Some members expressed a desire to further understand some of the new technologies discussed, such as batteries, biomass, and hydrogen. Members wanted to further understand where these resources fit in, and how/if storage is being considered as a resource option. There was some concern expressed about combustion turbines being included as a resource option. Members noted the role of biomass in electrical generation versus space heating should be clarified, as well as the use of hydrogen for storage and dispatchability. It was suggested that the term "batteries" be expanded to "energy storage".
- **Solar Resource Assumptions:** A member shared concerns related to the assumption that solar is noted as zero capacity in the winter, which contradicts data from research locations in Winnipeg and Norway, where the lowest month sees 10% solar output. It was suggested that snow poses a bigger issue than limited sunlight. Assumptions for peak hours should be clarified.
- **Evaluation of Resource Options**: Clarification was sought on how cost, technology uncertainty and consumer behavior change would be considered when evaluating resource options. The committee encouraged further consultation with customers and data from consumer polls on consumer choices and affordability to inform the evaluation of resource options.
- **Strategy D:** Members expressed concern Strategy D policy assumptions did not seem realistic as this would eliminate the use of hydrogen, landfill gas (renewable natural gas), biomass, and any combustion even for backup or emergency purposes. It was suggested that the definition of Strategy D be changed to a more realistic policy articulating "no fossil-based resources". Members also shared that the use of natural gas was considered acceptable for emergency circumstances. Manitoba Hydro shared the idea behind Strategy D was to look at what an absolute zero grid future could look like, though it was noted that this feedback has been heard several times throughout Round 1 engagement and will be considered.

Modelling and Analysis Approach

Slides: 10-27

- Details were provided on the Modelling and Analysis approach for the 2025 IRP, including how scenarios and sensitivities fit into the process. This included the current proposed listing of sensitivities and their prioritizations.
- **Modelling and Analysis:** Throughout the modelling and analysis process Manitoba Hydro expects to model and analyze more than 50 scenarios and sensitivities. The result of the modelling and analysis process will be a set of meaningfully different

potential development plans that will move forward into the evaluation process, which will include the application of evaluation metrics.

- **Scenarios:** An overview of eight proposed scenarios was provided. Scenarios represent a likely pairing of a load projection and resource option strategy, used to represent a possible energy future. Once scenarios are defined, they can be applied in the capacity expansion planning model, which in turn will output key information defining a possible development plan. Scenarios range from Scenario 1A - the least restrictive energy policy paired with the lowest load projection, to Scenario 3D - the most restrictive energy policy along with the highest load. It was shared that only likely parings will be studied, this was confirmed by members as a reasonable approach.
- **Limitation of Space Heating Assumptions:** Members expressed concern that only having three load projections may be limiting. It was suggested that the full electrification of home heating should be considered in an additional load projection. There were concerns that planning assumptions do not consider replacements prior to end of life, and that it is not clear how consideration of other space heating options such as air and ground source heat pumps, or biomass are considered within each load projection.
- **Sensitivities:** An overview of sensitivities was provided. Sensitivity analysis helps explore how changing a specific input or assumption can impact or change a development sequence. A sensitivity is used to test the potential impact of an assumption change on development plan results. The initial prioritizations focus on sensitivities that will provide insights that are relevant to understanding what is expected to be the most likely risk and regret factors, such as market prices, capital costs, and in-service date delays.
- **Additional Scenarios and Sensitivities:** Members suggested the full electrification of transportation and space heating should be considered as an additional scenario. Members noted additional considerations for scenarios and sensitivities including market prices, upset limits, cost and operational impacts of overbuilding, operations and maintenance, technology/equipment availability and behavioural changes. Behavioural changes in response to high utility costs, as seen in Alberta, were also mentioned.

Evaluation

Slides: 28 - 39

- **Evaluation Metrics:** The four proposed value themes were reviewed: Reliability, Costs, Environmental, and Social. The purpose of the evaluation step is to undertake a broad assessment of strengths and weaknesses of the potential development plans. The evaluation process is intended to be an engagement-informed assessment used to arrive at a short list of potential development plans and help inform a balanced recommendation.

- **Balanced Recommendation:** The goal of arriving at a balanced recommendation was shared. The recommendation will go beyond lowest-cost analysis and just meeting reliability planning criteria. The result is intended to be a balanced recommendation that meets foundational energy system reliability requirements (traditional reliability planning criteria), addresses policy and mandates, is robust to changes and uncertainty about the future, and reflects what Manitobans has shared is important to them related to energy planning. The recommendation is intended to reflect the needs and priorities of Manitobans. As with any multi-objective problem with competing values, it is expected that no single development plan will be a top performer in every metric or value. It was noted that this is a new step in the IRP development process, and it is expected that the methodology will evolve with future IRPs.
- **Value Theme Prioritization Activity:** To seek additional feedback on the relative importance of which value theme, a table-based prioritization activity was facilitated with members to understand what is most important to them and why. Each table had a notetaker/facilitator assigned to record the discussion.
    - **Reliability:** Generally emerged as the top priority with many noting it as crucial. A member noted that for many business and industrial customers, the cost of unavailability is much higher than the cost of energy itself.
    - **Cost:** It was noted that the value themes were interconnected and that each had their own "cost" associated with it. It was suggested that calculating the cost associated with each metric be considered for a more direct comparison across the metrics. The use of "cost" as shorthand for rates was debated, with some participants regarding it as too broad of a concept. It was shared by a member that low energy rates might encourage power waste and that costs should reflect real expenses rather than being inflated to reduce usage. interdependency between cost and reliability was emphasized.
    - **Environmental:** Environmental responsibility was considered highly important, with participants expressing a willingness to pay more for it. However, it was acknowledged that not everyone can afford this choice. The environmental and social impacts of Manitoba Hydro were seen as significant and noted they should be addressed through government mandates, policy, and regulations.
    - **Social:** Some participants believed that the cost of energy should be based on providing reliable service rather than being used as a tool for social justice or penalizing certain groups. A member noted that Manitoba Hydro should not be used as a social justice tool. Some argued that Manitoba Hydro should focus on its core mandate of providing reliable energy and leave broader social and environmental issues to government policy. Some members suggested that evaluation needs to articulate clearly what the roles and responsibilities are for Manitoba Hydro as compared to the Province.

        - **Reconciliation** was noted and seen as integral to all aspects of energy transition. Reconciliation was viewed as a foundational component that considers past and current impacts and intersects with other priorities. Some members noted that reconciliation should be considered as its own value theme. The impact of Manitoba Hydro on northern communities and the need for a just energy transition were highlighted as significant issues that require attention.
        - **Economic Reconciliation:** It was noted that when comparing future resource development plans, considering opportunities for economic reconciliation is appropriate.
- **Evaluation Metrics Breakout Activity:** A breakout discussion activity was facilitated with members to seek feedback on the metrics within each of the four value themes. Four stations were set up with a notetaker/facilitator and subject matter expert to discuss. Members were invited to move around to each station to provide input or to provide written input in a breakout activity workbook. A summary of feedback from this activity is included below:
    - **Reliability:**
        - **Adequate supply metric:** Members highlighted the need for system improvements in transmission and distribution infrastructure, emphasizing the importance of distribution reliability for the energy transition including public communication related to reliability expectations. Several issues were highlighted including EV distribution, backup power, and the impact of behind-the-meter solar. Climate resilience (emergency preparedness), load demand impacts, and the commitment of neighboring communities to load growth were also discussed, along with the importance of maintenance and the impact of extreme weather failures.
        - **Resource diversity metric:** Members noted the importance of considering diverse resources in a hydro dominant system. Discussions focused on clarifying and understanding the assumptions behind the resource diversity analysis and how different resources are utilized.
        - **Technology maturity metric:** Members identified the need to understand how resources are identified and evolve in maturity from Manitoba Hydro's perspective. The importance of incorporating long-term stationary energy storage was emphasized, as well as considerations of commercial availability, location, and operations and maintenance impacts. Establishing a baseline of technologies considered in IRP 2025 was suggested.
    - **Cost:**
        - **Net system costs metric:** Members suggested the metric consider neighboring communities commitments and impacts on load

growth, the importance of maintenance, and impacts of extreme weather failures.

    - **Direct customer cost metric** should consider the balance between customer costs and affordability impacts. Members emphasized the inclusion of societal costs in developments plans and potential to assign a dollar value to environmental and social costs. Regional targeting of energy efficiency programs and rate designs were identified as opportunities, as well as timing of EV charging. Clarifying what is included within this metric would be helpful, including whether it includes all new appliances or just additional, and if it includes behind the meter self-generation.

- **Environment:**
    - **Greenhouse gas metrics** should clearly explain what is included within the calculations. Members emphasized the importance of ensuring the development plan meets requirements for a net-zero grid by 2035, and answers if Manitoba can serve transportation and space heating needs without using fossil fuels. Suggestions were that emissions calculations should consider the social costs of carbon, methane releases (e.g., from flooding), grain drying, and the potential of carbon offsets. A member sought clarification on whether the metric would consider changes to land-use (e.g., permafrost).
    - **Environmental metric** considerations included resilience, ecosystem health, impacts on wildlife, and sources of environmental monitoring data. The effects on ecosystems and species population health were identified, along with the impacts of recent and ancient sun exposure. Historic and present environmental impacts and unresolved issues, such as short-term water licenses on dams, were noted. Behavioural considerations included personal responsibility in power conservation.

- **Social Metrics:**
    - Members emphasized that Reconciliation or **Economic Reconciliation metric** could be its own value theme. They noted the need for a baseline definition of economic reconciliation, suggesting it should address historical and ongoing impacts, with a focus on public interest and quantify these impacts for future measurement. One member highlighted the importance of acknowledging an Indigenous worldview, noting this is circular and should include both storage as well as generation. Members stressed the importance of being involved in planning and policy development, highlighting the need to redefine roles and relationships through trust, transparency, governance, and empowerment.

Next Steps

Slides: 45 - 52

- **Additional Session:** The chair proposed that based on interest from members, there could be an opportunity developed as an optional session for members to further discuss and address questions related to resource options, energy and capacity. Members were receptive to this optional meeting being offered with many raising their hands with interest in participating.
- The chair noted the next regular scheduled meeting will take place in Spring 2025. It was suggested the optional session could be scheduled in early January 2025 as well as an additional session in February 2025 to update members on how engagement feedback has been considered. Members were receptive to these meetings being added.

Manitoba Hydro 2025 Integrated Resource Plan	Technical Advisory Committee Meeting #4 Summary Notes

Purpose of Notes:

Meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. How Manitoba Hydro takes action on this feedback, is considered along with input from other engagement conversations throughout the 2025 Integrated Resource Plan process. The outcomes of engagement and any actions taken are published following each engagement round in a "What We Heard" document and the Engagement Report with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date & Location: January 31, 2025 – 10:30am-12:00pm – MS Teams

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair– Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Government of Manitoba – David Scammel Manitoba Chamber of Commerce – Green Advantage – Sarah Duval Manitoba Métis Federation – Reed Forrest University of Manitoba – Cameron Whitton Manitoba Sustainable Energy Association – Wayne Clayton Manitoba Industrial Power Users Group – Dale Friesen
Supporting attendees:	Manitoba Hydro – Adam Marcynuk Manitoba Hydro – Diana Mager Manitoba Hydro – Jennifer Korotkov Manitoba Hydro – Kathy Allard Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Shoni Madden Consultant – Urban Systems – Ryan Segal Consultant – Urban Systems - Kayla Dawson Consultant – Urban Systems - Hannah Patton
Regrets:	Additional session – attendance optional

Meeting Agenda:

1. Introductions
2. The 2025 IRP and Integrated Resource Planning
3. Key Concepts in Energy Planning
4. Resource Options
5. Next Steps

Introductions

Slides: 1 - 7

- **Meeting Overview and Purpose:** An overview of the meeting's purpose was provided, and the chair noted that all information presented at the TAC is proposed and open for discussion and feedback. The information may evolve as it is finalized to incorporate feedback heard through engagement. Feedback was shared that there was interest in better understanding key concepts of energy planning at Manitoba Hydro and how that relates to resource options. The chair noted that the session would cover key energy planning concepts and revisit resource options for further discussion. A presentation was developed to share high level information on what Manitoba Hydro considers when it conducts energy planning; continue discussion on resource options and their characteristics; and provide an opportunity for further discussion.
- **Questions Received:** Participants were asked to identify through a survey in advance any key topics and resource options they would like to hear more about, and additional questions they would like to see addressed in the discussion. The facilitator provided an overview of the feedback which included additional discussion of residential/commercial application of renewables, treatment of energy efficiency as a resource option, and the projected energy storage options over the next 5-20 years. Additional questions ranged from additional details on scalability of renewable generation options in the near-term, consideration of artificial intelligence, and potential impacts of tariffs on energy exports.

The 2025 IRP and Integrated Resource Planning

Slides: 8 - 11

- An introduction to Integrated Resource Planning was provided. An IRP is a process that utilities use to understand and plan for future energy needs. Developing an IRP is a repeatable process that can be updated as future conditions evolve. An overview of the ongoing planning cycle was shared. The IRP is part of the ongoing planning cycle at Manitoba Hydro and existing planning processes anchor the IRP development process. The IRP is unique in the fact that it incorporates engagement.

Key Concepts in Energy Planning

Slides: 12-22

- Foundational concepts in energy planning were shared to bolster participants' understanding of energy planning as part of the IRP process. Concepts included:
    - **Major facilities:** Manitoba's energy infrastructure is an integrated system comprised of hydro, thermal, and wind generation, transmission, and natural gas distribution.
    - **Capacity, energy, peak demand:** Manitoba Hydro's electrical generation system provides both energy and capacity. The system must have capacity to meet the peak demand that customers place on it and be able to provide the energy required throughout the day. When the peak demand is greater than the system capacity, or energy supply over time is short, there is a need to add more generation capacity to the system or reduce demand.
    - **Reliability planning criteria:** Manitoba Hydro's mandate is to reliably supply to customers. Manitoba Hydro applies various planning criteria across various components to meet this mandate to reliably supply energy to customers.
    - **Water flows:** Recognizing that our electricity system is predominately hydroelectric, water flows have a significant impact on the operations of a hydroelectric system and as shown in the graph, water conditions can vary significantly year to year. Manitoba Hydro plans to supply both Manitoba demand and dependable exports under all flow conditions, including the worst drought on record which was last recorded in 1940/41.
    - **Interconnections:** Manitoba Hydro's interconnections provide reliability and enable economic operations. Interconnections to neighboring systems serve a major role in complementing Manitoba Hydro's predominately hydropower system to provide reliable energy to customers while also seeking out economic opportunities.
    - **Electricity and natural gas demand:** Electricity demand varies significantly by season, day of the week and time of day. This variation needs to be considered in our planning so customers are supplied with electricity and natural gas when they require it. There is a strong relationship with weather, with the electricity system showing a slight increase in the summer months associated with air conditioning or cooling load, but a significant increase is found in the winter months associated with Manitoba's winter heating needs. It was noted that a new system peak event took place on January 20th, 2025. The natural gas demand has a very similar winter peak related to space heating.
    - **Natural gas system:** Natural gas is delivered through an integrated North American market consisting of production, long-duration storage and interconnected large-capacity pipelines. It was noted that the natural gas system in Manitoba is comprised of discrete distribution networks that are

connected to the TCPL mainline and serve specific regions as opposed to the interconnected nature of our electric system. Gas distribution systems are planned to the "design day" (coldest day). On the coldest days, the gas distribution system delivers the equivalent capacity of 1.4x the electric system.

  - **Transmission & distribution:** Distribution is mostly geographically localized. Concentration of electric load changes has significant considerations to the distribution
    system. It was noted that the existing network includes HVDC transmission lines, AC transmission lines and significant distribution infrastructure that are going to be required in any future. Building new transmission and distribution for new customers that needs to be considered, but it is critical to ensure the existing systems can support any future energy transition that may unfold.

- **Water Flows:** Members noted the increasing variability and inconsistency in water flows and emphasized the reliance on spring runoff. Questions were raised about the data points used to determine system averages and whether the additional water is from glacial melt. Members suggested that historical data may not capture the wider variability being experienced today and asked how planning criteria can be adapted to account for seasonal, monthly, and daily fluctuations in water availability. These questions highlight the ongoing planning that is happening, and the different levels of detail, and different time scales used for planning.
- **Solar:** A member noted that solar was not explicitly mentioned in the reliability planning criteria, and while solar cannot be relied on for peak demand, it could play an important role in future system reliability. It was noted that the overall reliability planning criteria used by Manitoba Hydro is for the system as a whole and not one technology. Solar is considered for energy production throughout the planning process.
- **Off-Grid Communities:** A member noted the four off-grid communities shown on the Major Facilities diagram. Due to their off-grid locations, four northern communities are not connected to the Manitoba Hydro transmission grid and are reliant on diesel generated electricity supplied by Manitoba Hydro. The four communities are: Shamattawa (Shamattawa First Nation), Tadoule Lake (Sayisi Dene First Nation), Brochet (Barren Lands First Nation), and Lac Brochet (Northlands Denesuline First Nation).
- **Distributed Energy Solutions:** A member noted the importance of integrating distributed energy solutions to manage and potentially reduce load and future infrastructure expenses. It was suggested that incentive structures for home solar, wind and batteries could be used to offset capital costs. The IRP and long-term planning are done at the utility scale but the benefits to distributed energy and self-generation were noted. The last IRP had an action to advance regional planning, like for demand forecasting, and this IRP could have similar actions. There is a need for metering technologies to understand time of day use and time of use rates.

- **Summer Cooling Loads:** Members noted that there are increasingly higher summer cooling loads. The 2025 National Building Code will include a requirement for maximum allowable interior building temperatures as a climate change mitigation measure. This will increase energy requirements for cooling in new buildings when this code is adopted. Eventually those requirements will be introduced into codes for alterations to existing buildings (or retrofits).
- **Transmission & Distribution:** Members noted that it is still unclear how Transmission and Distribution needs will be articulated in the IRP.
- **Equitable Data Analysis:** A member noted the importance of GBA+ or intersectional analysis when looking at data. A GBA+ analysis frames the relationship among members of different identity groups (like women, LGBTQ2LGBTQ2S+, disables, low income) and their access to services, resources and activities. It asks for thinking and analysis about how different policies affect people of all identities, not just the typical approach.

Resource Options

Slides: 23 - 29

- An overview of foundational topics regarding resource options was provided. Resource options represent the potential solutions to help address growing load as identified in the different load forecasts. There is a wide range of different ways in which to generate electricity. Monitoring new technology potential, market availability and prices are constantly evolving, and something that is actively monitored and updated my Manitoba Hydro.
- **Resource Options Inventory:** An overview of the resource options inventory was provided. These are the resources that are available at a utility scale that can potentially be used to serve future loads. In addition to the resources identified and shared, there are several other resource options that exist, some of which are immature and/or still in the development or demonstration stages. Manitoba Hydro continues to monitor these other options and adjusts the inventory as required.
- **Resource Characteristics:** An overview of the resource characteristics each resource option is considered based on was provided. Each resource option has a range of specific characteristics that define how that resource could potentially be used to meet Manitoba Hydro's system needs. These characteristics define how each resource can operate within the energy system, and how they can potentially become part of a development plan to meet future needs. An overview of the characteristics of wind generation, combustion turbines, and small modular nuclear reactors were provided as examples.
- **Coefficient of Performance:** A member suggested that the analysis should look at buildings being heated with a coefficient of performance of 2.5 (which is typically associated with district heating). It was noted that load projections which embed

district heating assumptions and ground source heat pumps resource options are both being looked at. It was noted that specific coefficient of performance might not be considered in the 2025 IRP but could be considered in the other ongoing planning processes. Manitoba Hydro is constantly looking at all the emerging resources and new resources could be included in the IRP in the next cycle.

- **Energy Storage:** Members suggested that "energy storage" be used instead of "battery storage" to address a wider range of available technologies, and that thermal storage should be viewed as an important resource for space heating.
- **Environmental and Social Impacts:** Members noted that the broad social and environmental impacts and risk factors of resources are not being considered in the characteristics. There was an understanding that evaluation and future project planning would consider site specific impacts, but there is a need to consider broader impacts and risk factors. Examples were shared including: worker health issues with mining and waste disposal of uranium for SMR resources; flooding impacts of hydraulic resources; and biodiversity/land impacts of utility scale renewables (wind and solar).
- **Characteristics:** It was noted that “GHG Emissions” should be retitled to “Operating GHG Emissions”.
- **Energy Efficiency:** Members noted that energy efficiency is important to consider as a resource. Energy intensity is a key driver for load growth and the economy is very energy intense (heating being a key driver for that intensity). Encouraging higher performance buildings, use of efficient transportation, more efficient equipment (appliances, etc.), better heating and cooling systems, etc. can significantly reduce our energy intensity. It was noted that energy efficiency as listed within the resource options inventory is a bucket for additional energy efficiency above and beyond what is already assumed to be achieved by Efficiency Manitoba within the load projections.

Next Steps

Slides: 29 - 32

- An overview of the IRP process and upcoming Round 2 Engagement was provided.
- **Process:** Members shared their appreciation for the openness process and the opportunity to ask questions and have focused discussions.
- **Artificial Intelligence:** Members asked how artificial intelligence is being considered in the 2025 IRP. Manitoba Hydro is monitoring data centre processing energy load requirements. Currently there is not enough information today to know how to consider from an energy planning perspective.
- **Tariffs:** Members asked how potential tariffs could impact the IRP and energy security in Manitoba. Manitoba Hydro is monitoring from both an IRP perspective and ongoing operations. There are a lot of ongoing questions and uncertainties. The Province is actively participating in the discussions and Manitoba Hydro would follow their direction.

Manitoba Hydro 2025 Integrated Resource Plan

Technical Advisory Committee Meeting #6 Summary Notes

Purpose of Notes:

Meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. How Manitoba Hydro takes action on this feedback, is considered along with input from other engagement conversations throughout the 2025 Integrated Resource Plan process. The outcomes of engagement and any actions taken are published following each engagement round in a "What We Heard" document and the Engagement Report with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date: April 7, 2025 – 1:00pm-3:30pm

Location: Manitoba Hydro Place - 360 Portage Avenue, Winnipeg, MB

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair– Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick Association of Manitoba Municipalities – Duane Nicol City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Consumers Council of Canada – Peggy Barker Daymark Energy Advisors – Jeff Bower Eco-West/Éco-Ouest Canada – Shane Pelletier Efficiency Manitoba – Colleen Kuruluk Government of Manitoba – David Scammel Manitoba Chamber of Commerce – Green Advantage – Christa Rust Manitoba Industrial Power Users Group – Dale Friesen Manitoba Métis Federation – Christian Goulet Manitoba Métis Federation – Reed Forrest Manitoba Sustainable Energy Association – Wayne Clayton Public Utilities Board – Brady Ryall Sustainable Building Manitoba – Laura Tyler University of Manitoba – Cameron Whitton
Supporting attendees:	Manitoba Hydro – Adam Marcynuk Manitoba Hydro – Andrew Greaves Manitoba Hydro – Diana Mager Manitoba Hydro – Kathy Allard

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Manitoba Hydro energy for life

	Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Shoni Madden Consultant – Urban Systems – Ryan Segal Consultant – Urban Systems - Kayla Dawson Consultant – Urban Systems - Hannah Patton
Regrets:	Government of Manitoba – Teody Leano Manitoba Keewatinowi Okimakanak Inc. – Anita Murdock Red River College – Jose (Jojo) Delos Reyes
Meeting Materials:	Round 1 What We Heard Report Meeting Agenda (Distributed via email prior to meeting) Copy of Meeting Presentation

Meeting Agenda:

1. Introductions and Setting the Stage
2. How We Are Incorporating Feedback
3. Load Projection Sensitivity Planning Assumptions
4. Preliminary Modelling & Analysis Results
5. Closing and Next Steps

Introductions and Setting the Stage

Slides: 1 - 12

- **Meeting Overview and Purpose:** An overview of the meeting agenda and purpose was provided. The chair noted that all information presented is proposed and open for discussion and feedback. The information may evolve as it is finalized to incorporate feedback heard through engagement. The facilitator noted that the focus of meeting #6 is to share the key feedback heard through Round 1 engagement and resulting updates made to the key inputs, scenarios and evaluation metrics; to share preliminary modelling and analysis results and observations; and to continue to support openness and transparency throughout the development of the 2025 IRP.
- **Committee Updates:** The chair provided an update on the public posting of meeting summary notes (which are not detailed minutes) and membership list and introduced a new member, an Independent Expert Consultant hired by the Public Utilities Board. The Independent Expert Consultant will fully participate in the Technical Advisory Committee to observe engagement and to hear the feedback shared by members and how it has been incorporated. A drafted membership list was circulated for attendees to review and note any edits needed. A member asked if feedback could be shared on the posted notes, and the chair confirmed the team is always open to feedback on the summary notes.
- **Process Updates:** The chair provided an update on the 2025 IRP development process including work completed since December 2024. The project is currently in the modelling & analysis and evaluations step of the process. The focus of meeting #6

is to share the preliminary modelling and analysis results. Next steps include completing modelling and analysis, development of potential development plans which will be evaluated and undergo more detailed financial and risk analysis. The next meeting will focus on sharing the draft road map including draft recommended and alternative development plans, learnings, near-term actions and signposts.

How We Are Incorporating Feedback

Slides: 13 - 29

- **What We Heard Overview:** The chair presented a summary of what was heard through external engagement and how it informed the process to date. This was supported through the What We Heard summary and detailed slides highlighting key changes where feedback informed the key inputs, scenarios, and evaluation metrics.
- **Changes Based on Engagement Feedback:** Members asked for more information on any substantive changes that were made based on engagement feedback, with some noting that they were expecting to see more significant changes to the modelling assumptions and reconciliation value theme. It was noted that discussions around economic reconciliation are ongoing with interested parties to support the development of metrics for economic reconciliation. Engagement feedback also led to the development of a load sensitivity that would be presented in the next section.
- **Costs:** A member noted that the Cost evaluation metric includes net system cost and customer costs, but not customer benefits. The member noted that cost is not always the primary motive for customers to initiate a change, and that is it also important to recognize the benefits of costs the customers and rate payers would not incur. The member also noted the importance of ensuring the net system costs do not discriminate against a focus on energy efficiency and customer driven solutions. Manitoba Hydro noted that the intention throughout the process is to have energy efficiency on a level playing field with other resource options, and it was noted that this would be seen throughout the preliminary results presented. The customer costs are intended to consider an all of the Manitoba perspective, including where costs may be transferred to the customer. This feedback will be considered to make sure no adverse impacts occur through consideration of customer costs and benefits.

Load Projection Sensitivity

- **Objective:** Manitoba Hydro shared an overview of the sensitivity objective, developed based on engagement feedback heard from Round 1 engagement, including from the TAC. The load sensitivity explored what future energy demand would be in 2050 with a transition to absolute zero greenhouse gas emissions from space heating and ground transportation sectors.
- **Changes to Guiding Principles:** Manitoba Hydro shared how the development of the sensitivity required moving away from the guiding principles used to develop the

three load projections for the 2025 IRP, which itself creates execution risks that would need to be addressed. Key changes included:
    - Replacement of heating systems and vehicles before they reach end of life;
    - Removal of natural gas equipment for customers when they replace space heating systems; including smaller industrial and commercial applications; and
    - Significantly increasing market demand for heating systems & vehicles which then end abruptly in 2049/50.
- **Assumptions:** Manitoba Hydro provided an overview of the sensitivity assumptions.
    - **Ground Transportation Assumptions:** Manitoba market demand for vehicles may exceed supply and reaching absolute zero will be a challenge for medium and heavy-duty vehicle classes where limited options are available.
    - **Space Heating Assumptions:** Customers would be replacing over 110,000 gas space heating systems before they reach end of life. These would be replaced using alternatives such as air source heat pumps, cold climate air source heat pumps or ground source heat pumps. It was noted that increased market demand could lead to price increases, and that the heating and cooling industry required to ramp up and meet market demand would see an abrupt reduction in demand by over 50% after 2050.
- **Impact on Demand:** Manitoba Hydro shared the impacts the load sensitivity had on future electricity and natural gas demand to 2050.
    - The sensitivity significantly increases peak demand, requiring an additional 3,000 MW of capacity by 2050 as compared to the high load projection.
    - The sensitivity cuts natural gas consumption in half by 2050 as compared to the high load projection. This still includes some consumption of natural gas, recognizing the difficulty in replacing some industrial processes, and leveraging renewable natural gas. Industrial carbon capture and storage technology is assumed beyond 2050.
- **Net-Zero Assumptions:** Members expressed concerns about the assumptions used to achieve a net-zero economy by 2050 and the assumption of Direct Air Capture technology in 2049. Members expressed a desire to see assumptions that considered earlier emission reductions and consideration for alternate emission reduction solutions. It was noted by Manitoba Hydro that Direct Air Capture is being used as a proxy for negative emissions technology in this iteration of the 2025 IRP to understand energy demand needed to serve a net-zero economy. Future updates to the IRP may incorporate changes to this technology as it matures, as well as more information on the energy transitions occurring across individual sectors.
- **Carbon Tax:** A member noted that carbon tax policies have changed since the beginning of the process and asked how these changes are being considered in the scenarios and modelling. Manitoba Hydro noted that the sensitivity analysis is intended to explore the bounds of these types of changes.

- **Demand Side Management:** A member expressed concern with the energy efficiency assumptions in 2034-35 and how they impact the load curve. The member noted it is unclear what is driving the changes, as well as asked how the costs are determined for installation of alternative heating systems. The member asked if these costs are considered within the costs for energy efficiency programs.
- **Mode Shift:** A member asked why transportation mode shift was not being considered in the sensitivity assumptions. Manitoba Hydro noted that for the purpose of the analysis, a conservative approach was used assuming a shift to electric vehicles but no mode shift.
- **Public Communication:** A member expressed a concern that while the inputs and assumptions are iterative and will change in each IRP cycle, this might not translate to the public. It will be important to communicate the iterative planning cycle as the assumptions in the IRP could be used to drive others planning and decision-making.

Preliminary Results

Setting the Context

Slides: 30 – 39

- **Planning Horizon:** Preliminary modelling results and observations were shared for two key timeframes in the planning horizon. The mid-term point in 2035 aligns with the 10-year focus for the development plan timeframe, while the long-term point in 2050 aligns with the broader long-term planning horizon for the 2025 IRP.
- **Preliminary Model Outputs:** An overview was provided that the information shared are preliminary outputs of the model before analysis and evaluation metrics have been applied. The outputs include the portfolio of resources, net system costs and greenhouse gas emissions. The results are initial observations intended to share the trends and commonalities being seen, and to highlight unique observations that may be explored further in the analysis and evaluations.
- **Portfolios of Resources:** The portfolio outputs from the 8 scenarios were shown as an example to highlight that the results will show each portfolio which will include different combinations of resources that are available to be installed by 2035.
- **Clarifying Capacity & Energy:** An overview was presented to help remind members of the different planning criteria related to capacity and energy. The distinction was noted as important because a diverse resource portfolio can ensure reliability through capacity while optimizing energy use efficiently. Capacity planning and energy use are not always the same, just because a resource is available doesn't mean it frequently used. Therefore, it is important to recognize the context when the results show capacity or energy, and if it is capacity, whether that is installed or accredited capacity.
- **Load Factor:** A member asked for clarification on how the load factor is impacted as more processes become electrified throughout the planning horizon to 2050. The load factor is the relationship between peak load and average energy use.

- **Drought and Water Levels:** Members inquired about whether the model can solve for optimal resources for drought vs. high water years and if the model can consider costs for resources at different water levels. A member asked about whether the model can consider the use of solar and wind for maintaining water levels, and if in a low water year, the model could select more solar and wind. Manitoba Hydro clarified that the model is solving for both energy and capacity, which includes planning based on the worst drought on record. Extreme cases do not happen very frequently but need to be planned for to ensure reliability. Manitoba Hydro shared that the model does optimize water storage, but it is complex to model as hydro generation decisions need to be made in advance.
- **Resources:** Members asked other questions about how different resources in the portfolios are utilized, including some suggestions on communication. A member suggested changing the term battery storage to energy storage.
- **Economic Optimization:** A member asked if the economic analysis includes a climate cost analysis such as the social cost of carbon. Manitoba Hydro confirmed it does.

Mid-Term Portfolio of Resources (2035)

Slides: 40 - 49

- **Results and Observation Summary:** An overview of observations of the mid-term resource portfolios were presented with an emphasis on the existing system's role in meeting future energy needs. The load projections based on a net-zero economy by 2050 require early and significant load growth, accelerating need dates for both capacity and energy. Increasing restrictions on resource options lead to a higher total installed capacity and a greater variety of resource options required, which diverges from the focus on affordable energy. The range of available resource options in this timeframe is limited, with few expected to be available before 2035 due to long lead times, environmental licensing, technology maturity, and regulatory challenges. As a result, new resources in this timeframe will need to be added more closely to follow load growth. Effective policy decisions will be critical, as the current regulatory environment does not accommodate rapid load growth nor does it allow supply to be added ahead of demand. A few key observations were highlighted:
    - Customer-side solutions play a significant role the in mid-term, helping to manage load growth. These solutions would be in place of building new resources, which is why they are included in the portfolios.
    - Combustion turbines and wind are key scalable resources, unlike new hydropower. Combustion turbines are dispatchable and can be used when needed, while wind is variable and is not always available to meet demand.
        - Natural gas is consistently selected as a primary fuel source for combustion turbines as it is low cost and has a reliable supply.
        - Wind is selected by the model in scenarios with higher energy needs, especially when natural gas combustion turbines are restricted. Wind

becomes more cost-effective with higher export prices due to increased opportunities and revenue from selling excess to export markets.
  - Supply side enhancements require a generating unit to be taken offline. This means that excess capacity is needed to balance the loss of this generating unit. This specific planning on the optimal time to complete the supply side enhancements will happen outside of the 2025 IRP analysis.
- **Load Projection Assumptions:** A member asked for further detail on the load projection assumptions to better understand where efficiency programs are considered by different customer sectors including industrial, commercial, and residential demand. Manitoba Hydro shared that Efficiency Manitoba's three-year plan has been extended to 2050 and has already been taken off the each of the load projections as it reduces demand. Demand response is also maximized in each of the load projections. There are also additional selectable efficiency programs beyond the three-year plan that the model can select.
- **Resource Characteristics:** A member asked if any changes have been made to the resource characteristics that were shared with members since meeting #4, and if characteristics such as social acceptability and technology readiness were added. Manitoba Hydro noted that the characteristics have not changed since they were last shared, but that these considerations will be part of the evaluation of the potential development plans. It was noted that the model is quantitative, and that the evaluation step will be used to consider the more qualitative aspects, and that there is always interest in evolving the resource characteristics in future iterations of the IRP.
- **Resources Not Selected:** Members asked about the resources not being selected in the mid-term portfolio, including small modular reactors and solar. Manitoba Hydro noted that the model does not select some resources in the mid-term due to lead times beyond a ten-year horizon. The model also considers time of day and the shape of the load curve and is finding solar cannot provide energy when needed.

Long-Term Portfolio of Resources (2050)

Slides: 50 - 55

- **Results and Observation Summary:** Observations about the long-term portfolio of resources were shared. There is a significant difference in the total installed capacity and number of resource options in the portfolios of resources in 2050 as compared to 2035. Serving energy needs for a net-zero economy by 2050 requires significant new resources, driven by load growth assumptions and projections. Natural gas combustion turbines continue to be selected in modelling (even in scenarios meeting a net-zero economy) as it is an affordable dispatchable resource. Longer lead-time resources, such as new hydropower and small modular reactors (SMRs) are observed.
- **Resource Sequencing:** The sequencing of resources helps to inform when decisions need to be made – and more importantly, if those decisions that need to be made in this IRP or in future IRPs. Steps need to be taken to plan for longer lead-time

resources, like new hydropower or small modular reactors long before they are needed. These longer lead-time resources only appear at the end of the analysis planning horizon, which means that decision would only be expected in future IRPs.

- **Combustion Turbines:** Members expressed concerns about combustion turbines and asked if cost decisions are being optimized over other considerations such as environmental impact. It was noted that combustion turbines have a relatively low cost to operate for capacity and high cost for energy, while a resource such as wind has a high cost to operate for capacity but a low cost for energy – the model optimizes the combination of these resources in to achieve the lowest cost operation. The next steps on evaluation will consider other factors. Members expressed concerns about capital costs driving decision making.
- **Future Decision Making:** Some members expressed concerns about future decision making, noting that resources selected for capacity, such as combustion turbines, could be used more than intended by other decision makers in the future rather than building more costly resources that do not have greenhouse gas emissions.
- **Solar and Battery:** A member noted that while peak demand is often in the dark in winter, solar resources pair well with battery resources and should be explored further. It was noted that the current duration of utility scale battery does not currently meet peak needs, but that this technology will continue to be monitored.

Net System Costs, GHG Emissions, Sensitivity Analysis and Observations

Slides: 56 - 63

- **Net System Costs:** Net system costs include all costs for electricity and natural gas service including capital, maintenance and operating costs, natural gas costs, transmission and distribution infrastructure costs, fuel costs, import costs, and energy efficiency program costs, as well as export revenue. Net system costs results are not a financial analysis. Financial analysis, including potential customer's rate impacts and energy wallet, will occur for the recommended and alternative development plans.
- **Observation Summary:** An overview of net system costs, greenhouse gas emissions and sensitivity analysis observations were shared. Different portfolios of resources result in different net system costs. When there are restrictions on use of natural gas combustion turbines, there is a corresponding increase in net system costs. Mid-term portfolio costs are very similar, however there is a much wider range of net-system costs between long-term portfolios. This difference highlights the importance of considering the long-term costs when committing to assumptions in a scenario.
- **Greenhouse Gas Emissions:** It was observed that Manitoba's greenhouse gas emissions can be reduced by approximately 10 megatonnes through decarbonization. Supporting reductions for a net-zero economy by 2050 will require the use of negative emissions technology for any remaining emissions, including non-combustion emissions – this is a similar strategy included in other net-zero economy studies. The portfolios include the resources needed to serve the load of this negative

emissions technology. However, the 2025 IRP will not make any recommendations regarding their implementation; this will be deferred to future IRPs. It was shared that potential new generation resources will have minimal impact on overall provincial emissions reductions, as most emissions are driven by customer energy choices outside of Manitoba Hydro's control – such as those related to transportation and industry. Currently, emissions from Manitoba Hydro's electricity generation are already low, and the scenarios project negative emissions by 2050 due to strategies aimed at achieving a net-zero electricity grid by 2035.

- **Sensitivity Observations:** The majority of the sensitivities did not impact the amount of resources included in the portfolios of resources – what it did impact was the timing of when resources would be needed. The inclusion of negative emission technology does not impact the near-term decisions that need to be made regarding the recommended development plan in the 2025 IRP. Other resources that showed promise through the sensitivity analysis were selectable energy efficiency programs, utility scale batteries, hydrogen fuel combustion turbines, and market purchases. these will be tested further as analysis continues.
- **Energy Balance:** A member suggested that it would be beneficial to share more information about energy balance. The member noted that emission reductions are often motivated by efficiency savings and that changes to the energy profile are not always due climate change considerations.
- **Greenhouse Gas Emissions:** A member expressed concerns about including non-combustion emissions and the impact this may have on net-zero solutions. Some members suggested that emissions reduction efforts need to occur earlier in the planning horizon than 2049/50. A member suggested that committee representation from the agricultural sector would be beneficial. Manitoba Hydro noted the agricultural sector does participate in other engagement activities.
- **Energy Storage:** A member noted that energy storage solutions are more advanced than carbon capture. Additional research was suggested on energy storage solutions.
- **Policy Influence:** A member noted that the IRP analysis responds to energy transition policy and government decision-making. They acknowledged that Manitoba Hydro is trying to explore investments that are as effective and affordable as possible but can only work within the context of current policy direction.

Next Steps

Slides: 64 – 67

- The chair shared an overview of the methodology being used to move towards a draft recommended development plan. The draft 2025 IRP road map will be shared at the next meeting scheduled for May 15, 2025.
- Members expressed appreciation for the opportunity to ask challenging questions and for the IRP team's willingness to engage and provide answers.

Manitoba Hydro 2025 Integrated Resource Plan

Technical Advisory Committee Meeting #7 Summary Notes

Purpose of Notes:

These meeting notes summarize the discussion and feedback from the Technical Advisory Committee without attributing feedback to specific individuals or groups. Manitoba Hydro considers the feedback received alongside feedback from other engagement conversations held throughout the 2025 Integrated Resource Plan process. The feedback from engagement and any actions taken are published in the Engagement Report included with publication of the 2025 Integrated Resource Plan.

Meeting Details:

Meeting Date: July 17, 2025 – 9:00 am – 10:30 am

Location: Virtual – MS Teams

Attendees:

Committee attendees (members & alternates):	Manitoba Hydro – Committee Chair– Lindsay Hunter Academic (University of Winnipeg) – Patricia Fitzpatrick City of Winnipeg – Becky Raddatz Climate Change Connection – Curt Hull Eco-West/Éco-Ouest Canada – Dany Robidoux Eco-West/Éco-Ouest Canada – Shane Pelletier Efficiency Manitoba – Colleen Kuruluk Government of Manitoba – David Scammel Government of Manitoba – Teody Leano Manitoba Métis Federation – Christian Goulet Public Utilities Board (PUB) – Brady Ryall Daymark Energy Advisors, advisor to the PUB – Doug A. Smith Daymark Energy Advisors, advisor to the PUB – Jeff Bower University of Manitoba – Cameron Whitton Association of Manitoba Municipalities – Duane Nicol Sustainable Building Manitoba – Laura Tyler Manitoba Sustainable Energy Association – Wayne Clayton Manitoba Industrial Power Users Group – Dale Friesen
Supporting attendees:	Manitoba Hydro – Mike Shaw Manitoba Hydro – Andrea Wruth Manitoba Hydro – Lindsay Melvin Manitoba Hydro – Kathy Allard Manitoba Hydro – Shoni Madden

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	Consultant – Urban Systems – Ryan Segal Consultant – Urban Systems - Kayla Dawson
Regrets:	Manitoba Keewatinowi Okimakanak Inc. – Anita Murdock Red River College – Jose (Jojo) Delos Reyes Manitoba Chamber of Commerce – Green Advantage – Christa Rust Consumers Council of Canada – Peggy Barker
Meeting Materials:	n/a

Meeting Agenda:

1. Introductions and Setting the Stage
2. Two key findings from modelling and analysis
3. Summary and discussion
4. Next steps

See the following on the IRP Website for the information shared by Manitoba Hydro:

- Technical Advisory Committee Meeting #7 Presentation slide deck
- Project information session Presentation video
- Project information session Presentation video transcript

Introductions and Setting the Stage

Slides: 1 - 7

- **Meeting Overview and Purpose:** To provide an interim update, share two key findings from modelling and analysis, explain how these findings will contribute to the formulation of potential development plans, and share the next steps.
- **Introductions:** Members shared that they were looking forward to hearing updates on the progress of the IRP. Topics of interest included: the energy transition, key inputs including Direct Air Capture assumptions, modelling results, economic development and The Manitoba Hydro Amendment Act (Bill 28), climate change impacts, and impacts to municipalities and Provincial mandates.

Two key findings from modelling and analysis

Slides: 8 - 9

- An overview was provided of the two key findings that will guide the formulation and evaluation of potential development plan:
  - o There are six feasible resource options available that can be developed in the next ten years to meet demand (the development plan timeframe).
  - o The range of load projections studied in this IRP is broad, and Manitoba Hydro needs to identify a narrower range to focus on when creating a development

plan. This narrower range is made up of a minimum build-out target plus a risk margin. The narrower range considers what will provide the flexibility to best serve a reasonable range of potential future loads.

Six Feasible Resource Options

Slides: 10-13

- Manitoba Hydro shared all resource options considered and introduced the six feasible resource options.
- **Resource Options Modelling Characteristics:** A member expressed that the characteristics being used for resource options in the modelling process are limited and asked if Manitoba Hydro has expanded the characteristics throughout the IRP development process. The member noted inconsistencies in some of the factors being considered between resource options (i.e. regulatory considerations should be applied to all resource options). They suggested that without consistent information programmed into all resource options, it allows for significant bias in decision making. The member also suggested that there are additional ways to incorporate qualitative characteristics into the model that have not been considered. Manitoba Hydro replied that more clarity can be provided about what resource characteristics are being included in the modelling in communications moving forward. Evaluation metrics will be applied in the next step and will consider metrics that expand upon the resource characteristics considered in the model.
- **Resources that support economic reconciliation:** A member asked if resources other than wind and energy efficiency programs are being considered to support economic reconciliation, specifically combustion turbines and enhancements to existing hydrogeneration stations. Evaluation metrics will be applied in the next step that includes an evaluation of each potential resource option for its potential to support economic reconciliation, including whether the resource options would support Indigenous ownership, training, employment, and business opportunities.
- **Long-term resource options:** A member asked how resources that take longer than 10 years to develop are being considered for selection after 2035, beyond the 10-year scope of the recommended development plan. The member expressed concern that these resources will never be moved forward if they continue to not be seen as a viable option in the short-term. Manitoba Hydro noted that the IRP's near-term actions include the requirement to further investigate and consider resources with development timelines longer than 10 years. Preliminary modelling results showed that the time to make decisions on long-lead resources could be within the next five years and in the next IRP.
- **Energy storage:** A member asked if batteries could improve the effectiveness and viability of solar generation. While other utilities have success using batteries to store solar energy so it can be used later during peak demand, it is a less viable option on

the Manitoba Hydro system. Batteries are effective at providing shorter term energy storage to be used within a few hours or days; storing energy from one season to be used in a different season is not a viable option on the Manitoba Hydro system. When considering the Manitoba context, solar energy is plentiful in the summer, whereas energy is most needed in the winter.

- A member suggested using the term "energy storage" instead of "battery storage".

Resources Not Available for Development Plans to 2035

Slides: 14-19

- Manitoba Hydro shared an overview of the resources that are not considered feasible for the 10-year development plan.

Utility-scale solar

- **Smaller-scale solar:** Members acknowledged the challenges of utility-scale solar and asked how energy produced by private residential and commercial and behind the meter solar installations are being considered. Manitoba Hydro noted that the energy generated by private, behind the meter solar is considered in Efficiency Manitoba's forecast of electric savings, which are then subtracted from Manitoba Hydro's load forecasts to create the load forecasts considered in the IRP analysis.

Alternative fuel turbines and technologies

- **Biomass with carbon capture:** A member asked whether biomass generation with carbon capture and storage, and the associated carbon credits, is being considered. Manitoba Hydro noted that bioenergy with carbon capture and storage was considered in the modelling with the earliest in-service date of 2035. It was not selected to be included in the 10-year recommended development plan, but it will continue to be considered as part of the near-term actions and in the next IRP. Carbon credits from the operation of BECCS can offset emissions from natural gas combustion turbines and support a net-zero grid.

Resources Available for Development Plans to 2035

Slides: 20-30

- Manitoba Hydro provided a summary of the six feasible resource options that will be used to formulate the potential development plans. All feasible resources are mature technologies.

Additional energy efficiency programs

- **Consumer awareness and engagement:** A member provided a comment in the chat that more active engagement of Manitobans in the day-to-day operation of the electric system has the potential to significantly enhance participation in demand response and other programming options. Manitoba consumers may be unaware of the impacts of their consumption behavior. Transparency and visibility could encourage more active engagement, understanding, and participation in measures to adopt energy efficiency measures and reduce system peaks demands.
- **Building Code**: A member inquired about how building codes that improve energy efficiency are being considered and how changes to the building code will be considered in the future. Manitoba Hydro noted that Efficiency Manitoba provided a long-term projection of electric and natural gas savings, based on its current Energy Efficiency Plan to achieve their legislated targets. This long-term projection considered energy efficiency from codes and standards assumed to reduce demand for electricity and natural gas, including building codes. The Efficiency Manitoba's forecast of electric and natural gas savings was subtracted from the load forecasts for all scenarios considered in the IRP. Looking into the future, the IRP roadmap will include signposts, which are external influences that we monitor for changes that may impact our energy planning. One of the signposts is government actions, which includes energy policy and standards that influence the pace and scale of decarbonization, like changes to building codes.
- **District Geothermal / Thermal Storage:** A member asked if district heating is cost effective for new (greenfield) communities, particularly when compared to switching from gas to electric resistance space heating. Manitoba Hydro noted that installing district heating in new (greenfield) communities is typically more cost-effective than installing in existing (brownfield) communities with established gas infrastructure due to the costs of stranded assets and complexity of constructing around established infrastructure.

  Manitoba Hydro has limited data to assess the performance, costs, and implications of installing district heating systems in brownfield versus greenfield installations. We are working with third-party consultants to better understand the implications of district heating systems and how we could support both individual and large-scale district systems in the future. This includes exploring the potential for smaller pilot opportunities for district ground-source heat pumps, including through existing energy efficiency programs.

- **Thermal Modelling:** A member suggested a need to develop not just electrical modelling but also thermal energy modelling as part of the IRP development process. The member referenced an example of thermal energy storage in sand batteries.

Wind

- **Energy Storage:** A member asked if there has been consideration of wind energy generation with energy storage. Manitoba Hydro noted that wind generation with energy storage was considered during modelling and analysis. Modelling showed that energy is most needed in the winter during cold snaps and peak demand. Not only is wind energy an intermittent resource that does not provide dispatchable capacity, decreased energy production can occur in the winter and there can be multiday periods with not enough wind to recharge short-term batteries. We consider how wind energy can offset demand for hydrogeneration, leaving water in reservoirs for future use.
- There is limited effectiveness of batteries combined with wind and solar on a winter peaking system. Modelling showed that energy is most needed in the winter during cold snaps and peak demand. Solar energy generation is lower during these times. For wind energy, there can be multiday periods with not enough wind to recharge the batteries. Batteries are most effective when providing a few hours of energy storage to be used a few hours or days later; and the potential reductions in energy production mentioned above impact the ability to charge batteries.

Natural gas/biomethane fuelled combustion turbines

- **Greenhouse Gas (GHG) Emissions:** A member inquired about how much greenhouse gas emissions are estimated to be released annually during operation of natural gas fuelled combustion turbines. Manitoba Hydro noted that greenhouse gas emissions from the operation of natural gas combustion turbines will depend on specifications of the turbines that are installed and will vary from year to year depending on when and how often peak demand conditions occur. At this time, it is estimated that, on average, 20,000 to 40,000 tonnes of CO_2e will be released per year. Beyond 2035, all combustion turbines GHG emissions are assumed to be netted to zero.
- **Regulatory risks:** A member inquired about the potential regulatory risks associated with natural gas fuelled combustion turbines. Manitoba Hydro noted that gas fuelled combustion turbines will be operated on an as needed basis, during times of peak demand as a dispatchable capacity resource, which is within the requirements of current Clean Electricity Regulations. There is little regulatory risk associated with natural gas fuelled combustion turbines.
- A member noted that their mind changed and they now understand the value of using natural gas combustion turbines strategically in peak demand situations, as long reductions in gas use occur in other areas.

The Build-Out Target: Narrowing our Focus

Slides: 31 - 34

- Manitoba Hydro shared an overview of the proposed build-out target.
- A member requested that the 2021 Electric Load Forecast from the 2023/24 General Rate Application be added for reference.

Summary and Discussion

Slides: 35 - 37

- The session concluded with a summary of the two key findings and opportunity for further questions and discussion.
- **Greenhouse Gas (GHG) Emissions:** A member asked how greenhouse gas emissions are predicted to change between now and 2050 and inquired about the status of the assumption to use direct air capture to reduce overall emissions. A member sought clarification on the responsibility of Manitoba Hydro to mitigate all Provincial emissions. Manitoba Hydro noted that the IRP aligns with the Government of Manitoba's Affordable Energy Plan, which includes a path to net zero emissions for the Manitoba economy by 2050. Assumptions in the IRP result in an emissions decrease, with any remaining emissions requiring negative emissions technology to remove them from the atmosphere.
- **Drought Impacts:** Members expressed concern about drought conditions and impacts to hydro generation. A member inquired if solar energy generated during low flow/drought conditions can reduce demand on large hydrogeneration and support recharge of the reservoirs. Manitoba Hydro noted that it is valuable to have other resources, like solar, producing energy when we are experiencing low flow or drought conditions. However, Manitoba Hydro must also consider that we will not always be experiencing low flow conditions. During high flow conditions, solar energy would be in surplus which could lead to curtailing (turning off the generators) or exporting the energy produced. Exported energy is valued differently/less than energy used in Manitoba, so we must consider the return on investment of solar compared to other resources. For example, combustion turbines provide value because they can produce energy on demand in low flow conditions and will not be used during high flow periods.
- **Electric Vehicle Battery Storage:** A member shared that electric vehicle batteries can be leveraged for energy storage.
- **Biological carbon extraction**: A member shared that biological options for atmospheric carbon extraction exist that are already proven and not energy intensive.