2025 Integrated Resource Plan

Technical Advisory Committee

July 2025 – Meeting 7

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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.

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.

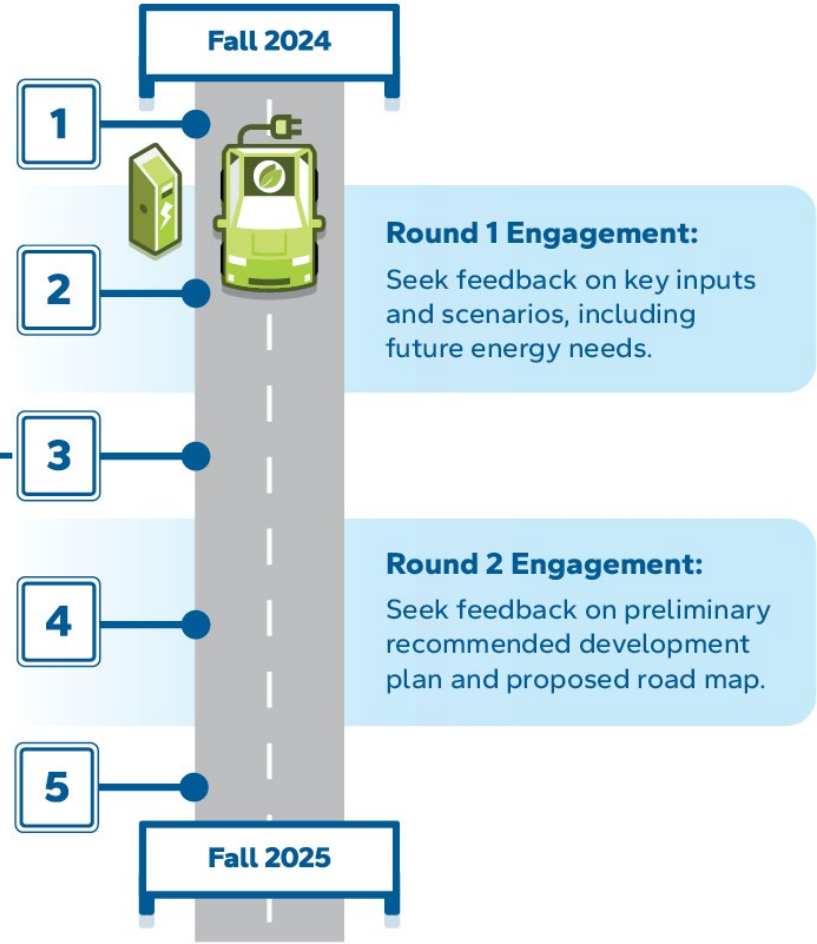
Setting the stage

Where we are in the development process

The 2025 IRP Process

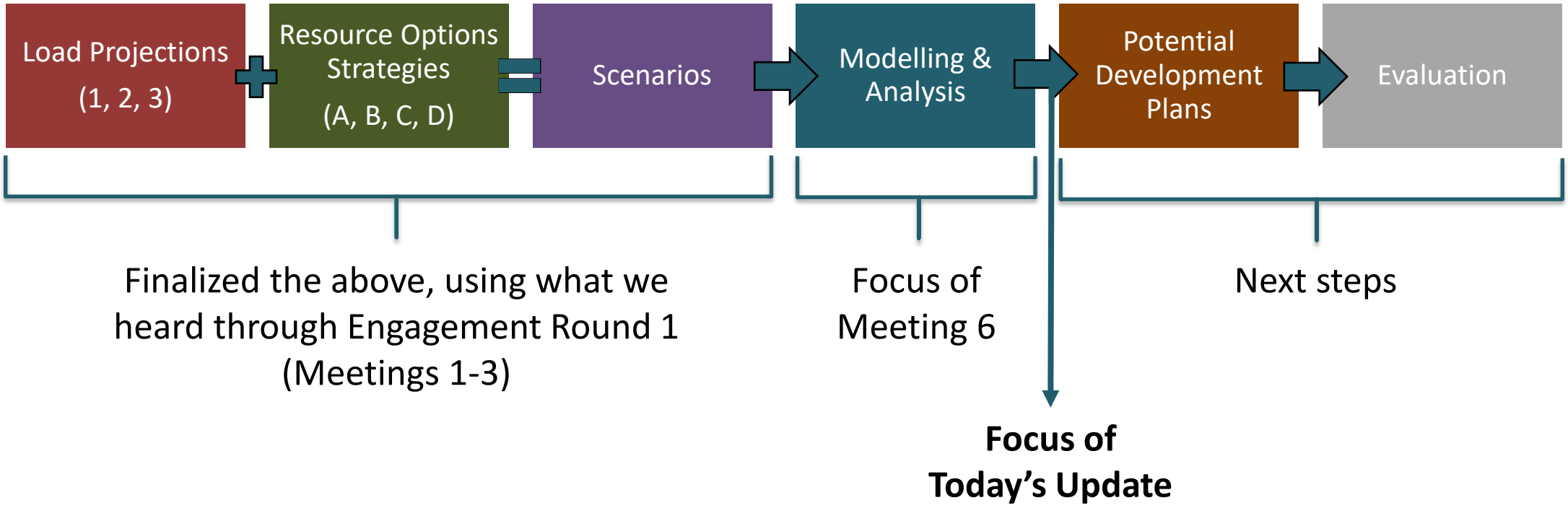
1. Setting direction
2. Develop key inputs and scenarios
3. Modelling, analysis, and evaluations
4. Preliminary recommendation
5. Finalize the Integrated Resource Plan

– 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.

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:

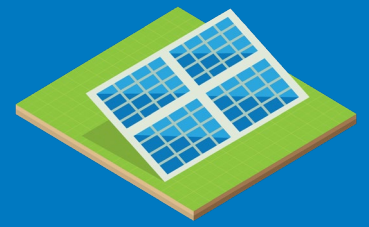
- Very long useful service lives (over 70 years).
- Source of dispatchable capacity; reservoirs provide energy storage.
- Lower operating and maintenance costs.
- Negligible operating greenhouse gas emissions.

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

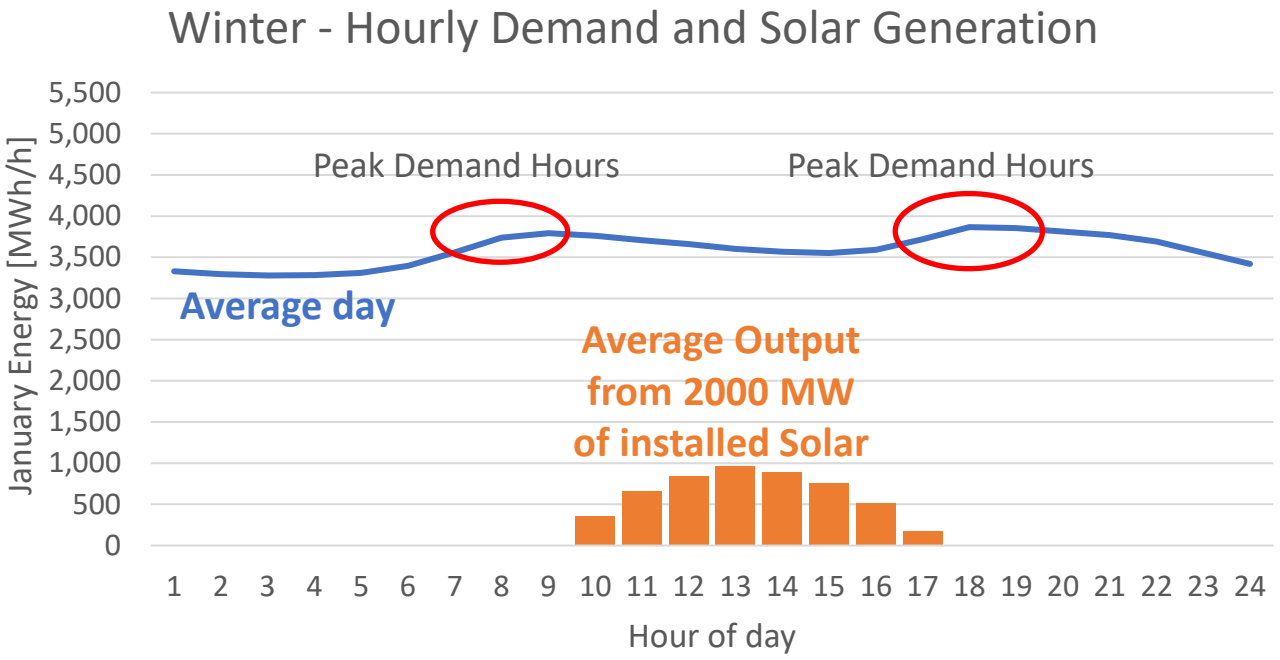


Advantages:

- 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

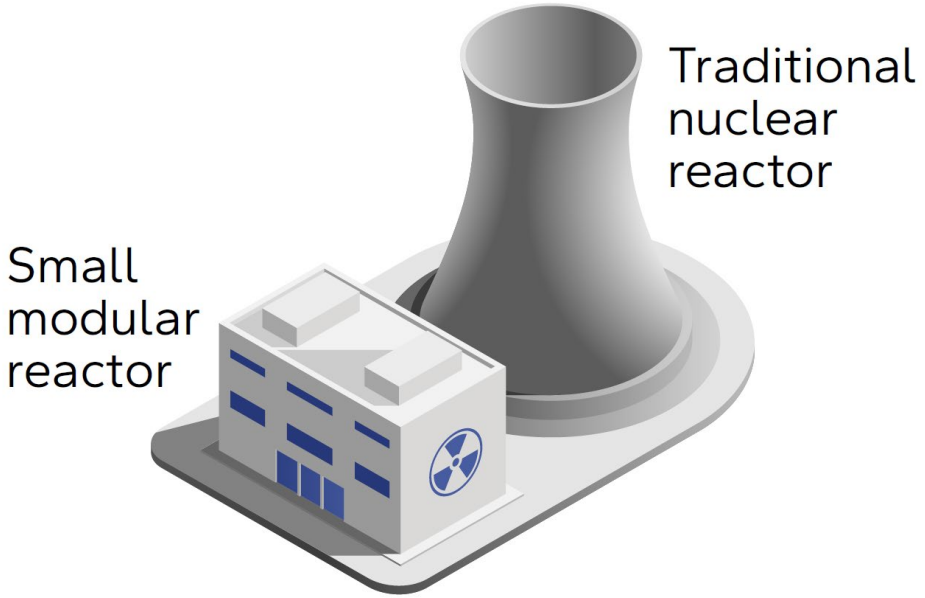
Why it’s not included: high cost; long lead times for regulation

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

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

Efficiency Manitoba Base Plan

Additional Energy Efficiency Programs

Wind

Enhancements to Existing Hydropower

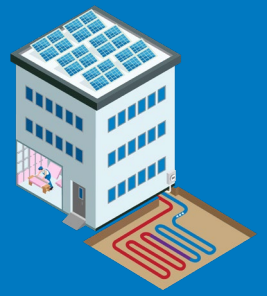
Batteries

Natural Gas/Biomethane Combustion Turbine

- 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:

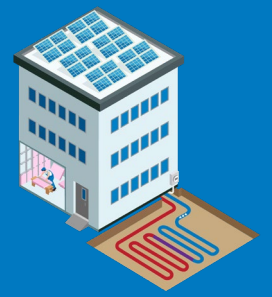
- Requires customer commitment for uptake of programs, creates uncertainty in adoption rates and timing.
- Limited market potential.

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.

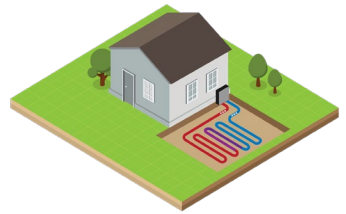
Advantages:

- 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

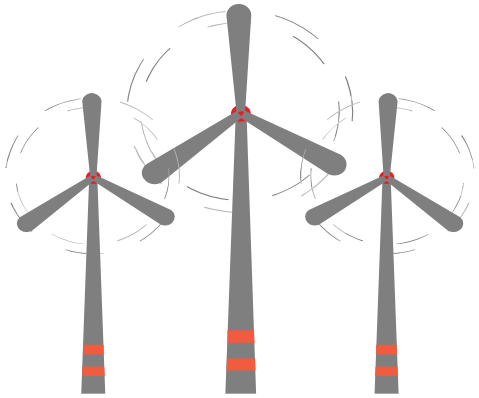
Why it's included: low-cost resource; short construction time; presents economic reconciliation opportunities

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.

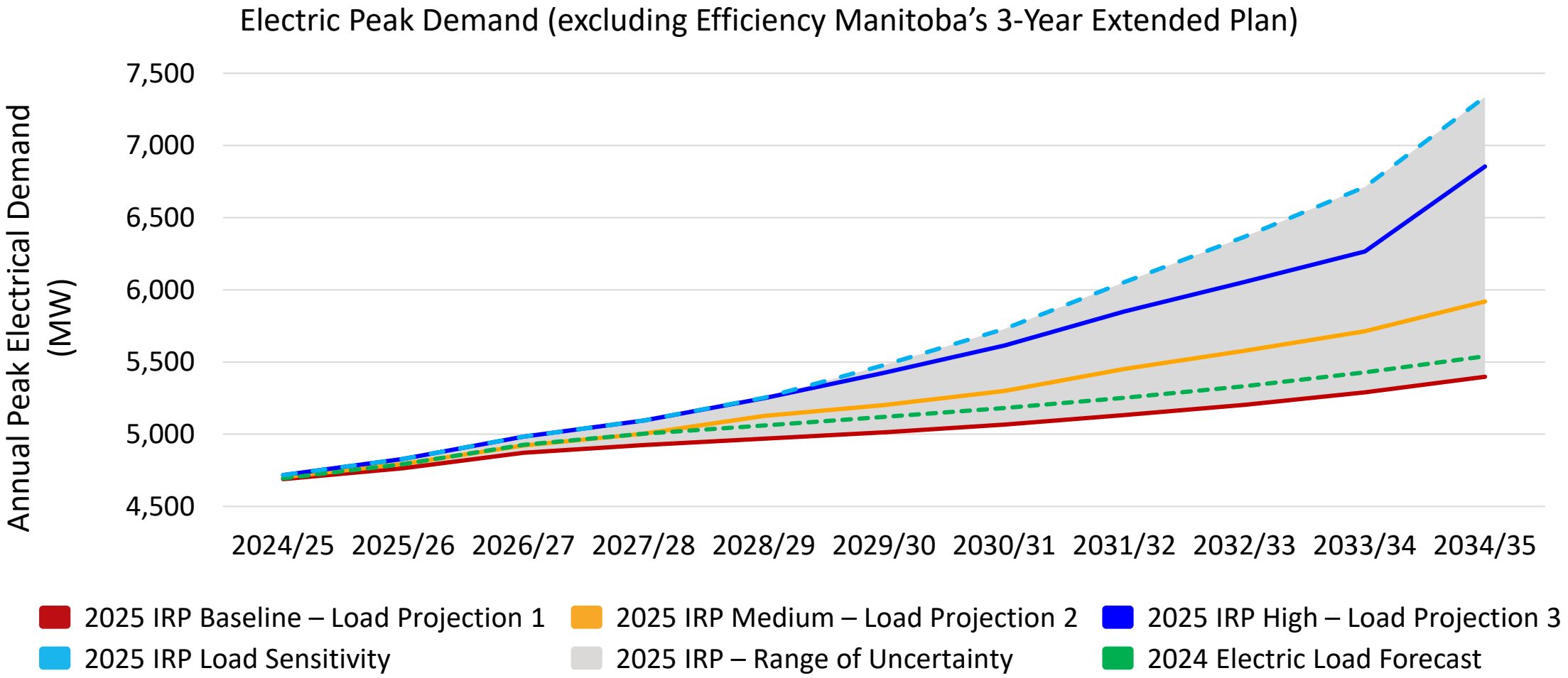
THE BUILD-OUT TARGET: NARROWING OUR FOCUS

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

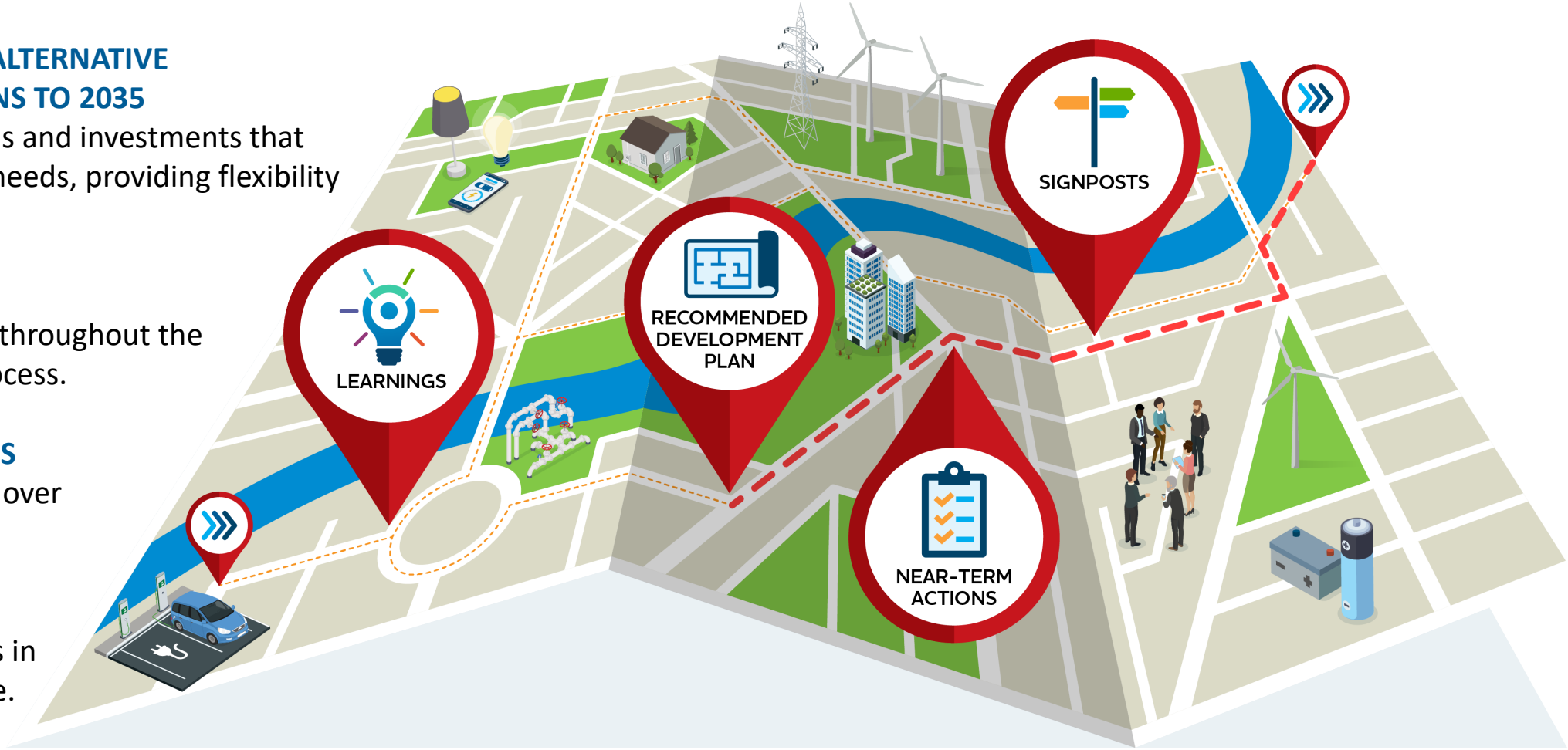
Feedback on draft road map will be gathered in Round 2

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!

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