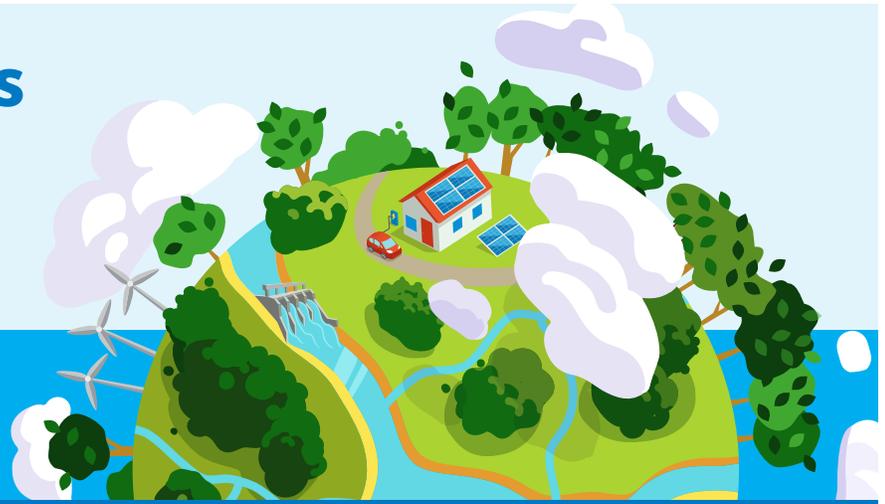


Manitoba Hydro's Integrated Resource Plan

Round 2 Questions and Answers



The following are responses to questions received throughout the Round 2 conversation in our Integrated Resource Planning process.

Buildings

How are building efficiency and building codes being considered?

Building efficiency and building codes are included in the assumption of the key inputs and other modelling inputs. It is possible that these will also be considered as a sensitivity in the modelling for the Integrated Resource Plan (IRP). More information on specific assumptions will be detailed in the final IRP report.

Clarification

Can additional information be provided on decarbonization and decentralization, including some of the assumptions and why these were chosen as the organizing principles?

Decarbonization refers to reducing carbon emissions by speeding up the pace of electrification. This includes reducing fossil fuel-based generation and exploring new, cleaner ways to provide natural gas and reduce the carbon footprint of this critical heating and energy source.

Decentralization refers to the increased availability of power options beyond Manitoba Hydro such as solar, wind or other alternatives that lead to a less centralized energy grid.

Decarbonization and decentralization, in addition to digitalization, are forces driving energy utilities around the world to rethink and reimagine how they serve their customers. The IRP is one of the strategic initiatives undertaken by Manitoba Hydro to successfully navigate the changes created by these forces for the benefit of Manitobans.

Is the intention that one of these scenarios would be applied to the entire 20-year plan, or will these scenarios be reconsidered in shorter increments along the way?

The IRP is intended to represent a broad range of possible energy scenarios, all of which have the potential to become the future in Manitoba, either individually or as a combination. The range allows Manitoba Hydro to prepare for a future that remains uncertain. Furthermore, the IRP is not a one-time process. It will be completed on a recurring basis with subsequent IRPs incorporating information from previous IRPs and insights gained along the way to refine and adjust scenarios as appropriate.

Which input categories are supply (generation) focused versus demand (load) focused?

The input categories, as defined through the key inputs, were not developed to represent a supply or demand focus. Rather, they each represent a collection of associated input variables that have the greatest uncertainty in the timing and pace of change.

Communities

How can communities prepare for a net zero future, and how will Manitoba Hydro work with communities and municipalities on supporting this transition?

Manitoba Hydro is committed to helping Manitobans understand their energy options and make informed choices, which includes providing information on the energy transition and supporting communities through our existing processes for service applications. There are also other supports for communities from provincial and federal governments, including:

- [Zero Emission Vehicle Infrastructure Program](#)
- [Incentives for purchasing zero emission passenger vehicles](#)
- [Incentives for Medium and Heavy-Duty Zero-Emission Vehicles Program](#)
- [Canada Greener Homes Grant](#)
- [Efficiency Manitoba Programs](#)

(Full web addresses are also listed at end of document.)

Customer self-generation

Self-generation needs to be conceptualized differently (e.g., competitive rates, load sharing, re-selling to grid) and should have more importance in the model given its prevalence in Manitoba Hydro's long-term strategy – Strategy 2040.

Many of the impacts of self-generation are seen at a localized regional level. Since this IRP considers a province-wide view, opportunities such as load sharing and re-selling to the grid is not analyzed. However, developing the IRP is an iterative process, so this does not preclude this type of regional analysis in future IRPs.

That said, scenarios were developed to reflect the current regulatory environment and customer choices, with assumptions on different rates of uptake. While all scenarios use existing rate structures, the IRP may consider the impact of different rate structures through the use of sensitivity analysis. Future IRPs will consider the impact of changes in government policy and incentives.

More information is needed on solar generation and how this could roll out in Manitoba.

Solar power is a resource our modeling can choose to meet each scenario's projected load. We expect to share information on solar power and how it was represented in the modeling assumptions in the next round of engagement.

Anyone interested in installing solar systems or other forms of distributed generation are welcome to contact Manitoba Hydro to discuss their plans. The process to apply will depend on the size and type of installation. More information is available at our website on the Generating your own Electricity page under Accounts & Services.

One of the scenarios should consider rapid electric vehicle (EV) adoption but slow solar adoption.

This option may be considered as a sensitivity in the modelling for the IRP.

Demand side management

How and where is demand side management (DSM) being considered in the modeling? Are smart meters being considered?

A consistent level of demand side management is included to reduce the load for each scenario and further levels of demand side management can be selected by the model as an energy resource, on par with other resources, such as wind.

Digitalization is considered an important force that is driving change in the energy landscape and smart meters are part of that change. Smart meters can support different demand response programs and will be considered within the Integrated Resource Plan's roadmap and near-term actions, if necessary.

Economics

Does the model consider economic recession, and whether economic growth could cause decreases in other factors?

Scenario 1 explores an economy that experiences lower than anticipated average growth over a 20-year time frame.

Different resource portfolios beyond hydroelectric should be explored in relation to local benefits.

The IRP modeling tool has a diverse portfolio of resources, beyond hydroelectric generation. Energy supply options being considered include wind, solar (both utility scale and distributed generation), natural gas combustion turbines (with possibilities for carbon offsets, carbon capture), hydrogen, improvement to existing generation, small modular reactors (nuclear), biomass, battery storage, and imports. Each option has unique costs and operating characteristics used to determine the most economical supply options to meet future loads.

The IRP report will clearly detail all resource options that were explored, and further information will be shared during the next round of engagement.

Electric vehicles (EVs)

Why has the uptake of EVs been lower in Manitoba compared to Canada as a whole?

There are a number of factors contributing to the higher rate of adoption of EVs elsewhere in Canada, including: milder climate, available financial incentives and more established charging infrastructure. These are factors which were also shared with us during our Round 1 Engagement survey.

Will charging EVs potentially have a different rate structure? More information is needed on the EV charging assumptions.

Managing EV charging is critically important to ensuring the ongoing reliable, affordable supply and delivery of electricity and can be achieved by variety of different approaches. The IRP may consider those approaches, including different rate structures, to understand any impact they have in keeping overall investment costs low. Any implementation of new rate structures will need to follow established processes of review and approval by the Public Utilities Board.

A sensitivity should explore the impact of a more aggressive EV adoption in Scenario 2.

A more aggressive EV adoption will be considered as a sensitivity in the modeling for the IRP.

Energy Sources

Recognizing the need to move away from natural gas for space heating, how is this considered in the modeling? Are other options (e.g., geothermal, air source heating pumps) being considered?

Yes, scenarios consider restriction of natural gas which will result in electrification of space heating.

Natural gas in Manitoba is an important source of energy both for industrial use and to heat homes reliably and cost-effectively. During winter, natural gas serves more energy demand in Manitoba than electricity. An important question the IRP will consider is what role natural gas has in meeting future energy requirements. This analysis will include looking at customer choices and preferences, policy requirements and technology capabilities.

The scenarios do not deal with a range of energy sources other than electrification (i.e. hydrogen and alternative fuels). The IRP report should discuss hydrogen assumptions and address other decarbonization fuels.

There are ongoing efforts to review and evaluate options to reduce carbon emissions from natural gas systems. Alternatives such as renewable natural gas (RNG) and hydrogen are in scope of the IRP to review and will be discussed in the report. There is still a lot of work, however, such as policy development, code development, etc., that needs to take place before these alternatives could be safely and reliably supplied to customers. Current operation of the natural gas system is always being reviewed to improve practices to minimize carbon emissions.

Energy supply options being considered in the IRP include wind, solar (both utility scale and distributed generation), natural gas combustion turbines (with possibilities for carbon offsets, carbon capture), hydrogen, hydroelectric generation, improvements to existing generation, small modular reactors (nuclear), biomass, battery storage, and imports.

Each option has unique costs and operating characteristics used to determine the most economical supply options to meet future loads.

Are small nuclear reactors being considered as a resource option for energy sources?

Yes, small modular reactors are being considered as an energy supply option in the IRP.

Inputs

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.

Manitoba Hydro's role

Does the modeling assume Manitoba Hydro will continue to operate as a monopoly?

Yes, the scenarios included in the IRP are based on Manitoba Hydro's current business model.

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

Modeling assumes export and import decisions will continue to be based on economics. When Manitoba Hydro has surplus energy (as it often does when water conditions are favourable), surplus energy will be offered to the export market. When energy is available on the export market at attractive prices, Manitoba Hydro may choose to import.

While import and export transactions are expected to continue to be an important aspect of power system operations, as load in Manitoba grows, it is expected that more of the electricity produced in Manitoba from existing generators will be consumed in Manitoba and net exports will decrease accordingly.

Does this account for hydroelectric power being considered not a "true renewable"?

The IRP considers energy sources powered by wind, sun, or water to be renewable and non-emitting. Energy sources using fossil fuels like natural gas turbines are not considered renewable. However, alternative approaches (ex. hydrogen fuel) show

promise in making these sources a cleaner option. Potential options to meet future energy needs will be compared and evaluated from a number of perspectives, including environmental impacts.

Policy

How are political uncertainty and policy constraints being accounted for in the models?

Federal and provincial energy policies inform the assumptions used in the IRP process. For example, the range of scenarios developed for the IRP process recognize the uncertainty in climate policy as an important consideration in modeling.

Reconciliation

The models do not appear to acknowledge the reality of communities living in the north.

While the IRP is taking a province-wide focus, it does include current and projected trends in energy use for all individual regions of the province. The scope of the IRP will consider new technologies for generation and/or energy transfer that may have relevance to or application in northern communities. Manitoba Hydro would be interested in hearing how the IRP analysis could better reflect or consider northern realities.

Where does reconciliation fit into the IRP modeling process?

The IRP report will include a roadmap with near-term actions to help Manitoba Hydro prepare for the future. That roadmap will consider, at a broad and conceptual level, social, environmental, and economic impacts, including general understandings of the positive and negative effects certain types of developments can have on people and communities.

Should Manitoba Hydro pursue developments in the future, they will be undertaken with the goal of continuing to build positive, mutually beneficial relationships with Indigenous communities and supporting the advancement of reconciliation with Indigenous people in Manitoba.

These plans need to include meaningful and equal participation for First Nation people and communities.

The IRP will consider new technologies for generation and/or energy transfer that may be relevant to individual communities in the future, but it does not consider specific projects. Given the province-wide scope of the analysis, we've sought to engage representative organizations and groups in workshops, including regional Indigenous umbrella groups that represent multiple communities. Participation opportunities focused on individuals and individual communities have occurred through surveys, updates on our external web site, as well as emails to those who have subscribed to get IRP updates.

Should Manitoba Hydro consider an individual or specific project in the future, potentially affected and interested communities, groups and parties would be engaged directly in that dialogue.

Scenarios

What is Manitoba's current situation with respect to the scenarios, and is there a baseline scenario?

The scenarios do not have a reference or Business As Usual (BAU) case. The energy landscape is evolving across North America and forces such as decarbonization, decentralization and digitalization are changing how utilities think about serving their customers. The intent of the IRP is to prepare for a broad range of possible futures so Manitoba Hydro can successfully adapt to this evolution.

Why do the scenarios not all focus on achieving Net Zero 2050?

While scenario 4 is on a pathway to Net Zero in the IRP analysis, the IRP must look at a range of scenarios to ensure the energy planning is robust. Manitoba Hydro needs to ensure we are prepared for the future, regardless of what happens.

Why did this process not back-cast from where we want to be in the future?

The purpose of the IRP is to prepare for what may happen, not to try and predict the future. There is a lot of uncertainty and change occurring in the energy landscape and to be successful in our planning we need to consider a range of outcomes.

How were only these four scenarios chosen?

We chose four scenarios as an appropriate number to effectively represent potential energy futures, establish bookends to the range of possible futures, and allow us to feasibly complete our analysis. The scenarios are intended to be broad enough to facilitate the identification of robust strategies even though they do not directly capture every possible outcome. These four scenarios will be supplemented by sensitivities to expand the range of futures studied.

There should be a fifth scenario (e.g., no natural gas and higher emphasis on public transit and more customer self-generation).

Sensitivities will be used in conjunction with the scenario analysis to expand the range of futures studied. By studying the impact of changes to specific variables and constraints as set for the scenario analysis, we can use sensitivities to more closely understand what affect they may have on potential energy futures. Modelling some level of customer self-generation and additional growth based on economics can be planned into the sensitivities.

Social considerations

Are cultural and social uptake and buy-in, as well as customer expectations, built into the modeling?

Yes, the cultural and social motivation for changes in consumer behaviour, such as incentives that affect uptake of new self-generation technologies or EVs, are considered in the preparation of the load forecasts used in the modelling.

Manitoba Hydro's planning should consider sustainability, affordability, and the rights of nature.

Sustainability and affordability are already part of Manitoba Hydro's normal business practices, including our energy planning. While the IRP will not provide a specific development plan or select specific resources, it will consider at a broad and

conceptual level, the social, environmental, and economic impacts when developing the roadmap. That roadmap may identify opportunities for further detailed planning on potential specific resources, where more robust consideration will be given to these important topics.

Technology

Does viability of new technologies apply to all other categories, not just decarbonization?

Yes, the viability of new technologies does apply to other categories. Key input factors have been updated to clarify this uncertainty.

Is there a roadmap of technologies likely to come out in the next 10–20 years to support planning of alternatives?

The IRP report will indicate what resource technologies were considered, as well as their degree of maturity.

Climate risk

Where does shock planning, climate change and meteorological change fit into the model?

Manitoba Hydro is currently investigating how best to model climate change and its potential impacts on energy needs and on future energy supply. It is possible that these will be included in a sensitivity within the IRP modelling.

Links

- Zero Emission Vehicle Infrastructure Program: <https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876>
- Incentives for purchasing zero emission passenger vehicles: <https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/light-duty-zero-emission-vehicles/incentives-purchasing-zero-emission-vehicles>
- Incentives for Medium and Heavy-Duty Zero-Emission Vehicles Program: <https://tc.canada.ca/en/road-transportation/innovative-technologies/zero-emission-vehicles/medium-heavy-duty-zero-emission-vehicles>
- Canada Greener Homes Grant: <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/23441>
- Efficiency Manitoba Programs : <https://efficiencymb.ca>