EXECUTIVE SUMMARY

INTRODUCTION

PURPOSE OF THE 2023 INTEGRATED RESOURCE PLAN

The energy transition is underway in Manitoba. How energy is produced, delivered and consumed is changing. Preparing for this change is a challenge utilities around the world are facing. As we move towards a cleaner energy future, technology, customer decisions and government actions are driving the pace of this change and impacting how Manitoba Hydro supplies and delivers electricity and natural gas.

Investments over the past 100 years to build out Manitoba's generation, transmission, and distribution system have resulted in a reliable, low-cost electricity supply. The rates Manitobans pay for electricity today are among the lowest in North America. However, Manitoba Hydro's energy and capacity resources are limited. The energy transition will increase demand for capacity in the electricity system, consuming the current surplus and driving the need for investments in new resources that will put upward pressure on costs. The pace of the transition will determine how quickly this happens, but new resources could be needed in the next 10 years.

Manitoba Hydro's 2023 Integrated Resource Plan (IRP) serves as a foundation for understanding the impacts of the energy transition and identifies actions needed to prepare for that change to ensure we continue to meet our customers' needs for reliable, low-cost energy and fulfill our legislated mandate. That mandate is: "...to provide for the continuance of a supply of power adequate for the needs of the province, and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution and end-use of power."

MANITOBA HYDRO'S ELECTRICITY AND NATURAL GAS SYSTEMS

On average, over 97 percent of the electricity Manitoba Hydro supplies our customers is clean and non-emitting. Any surplus electricity not needed in Manitoba is sold on the export market, helping neighbouring jurisdictions reduce their carbon emissions. We also supply customers in southern Manitoba with reliable natural gas that not only helps heat their homes in the winter but also is an input to many industrial processes. As a vertically integrated utility that supplies and delivers these two energy sources, we are well positioned to study how shifts in energy use will impact these systems and identify solutions that will keep energy rates as low as possible

MANITOBA HYDRO'S FIRST IRP

While there is a long history of energy planning at Manitoba Hydro, this was Manitoba Hydro's first IRP. The 2023 IRP advanced our planning process significantly. It considered electric generation, transmission, and distribution as well as natural gas as an integrated system. It also established a process that is structured and repeatable. Our focus was to understand the energy transition, including the changing needs of our customers, and identify the first steps needed to prepare for future decisions that will impact energy supply and delivery in Manitoba.

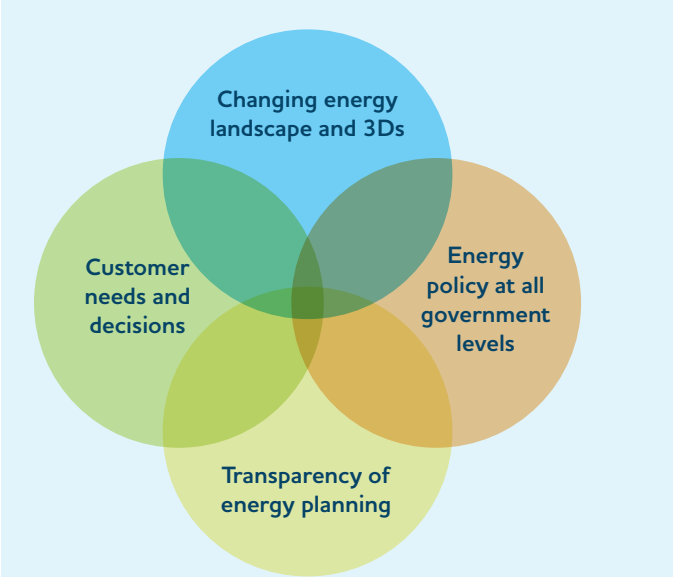

Figure ES-1 – Considerations for the 2023 IRP

With the 2023 IRP, we evolved our energy planning to include engagement with customers and interested parties to provide transparency in energy planning and develop a clearer understanding of our customers' needs and decisions. Throughout the process, engagement was aligned to key IRP milestones to ensure continuous and ongoing feedback. We also considered how existing and potential government policies at all levels are impacting the energy transition. Our goal was to be technology-neutral, so the 2023 IRP studied a variety of utility scale resources, non-Manitoba Hydro owned assets, behind-the-meter options, as well as Efficiency Manitoba programming.

IRP DEVELOPMENT & ENGAGEMENT PROCESS

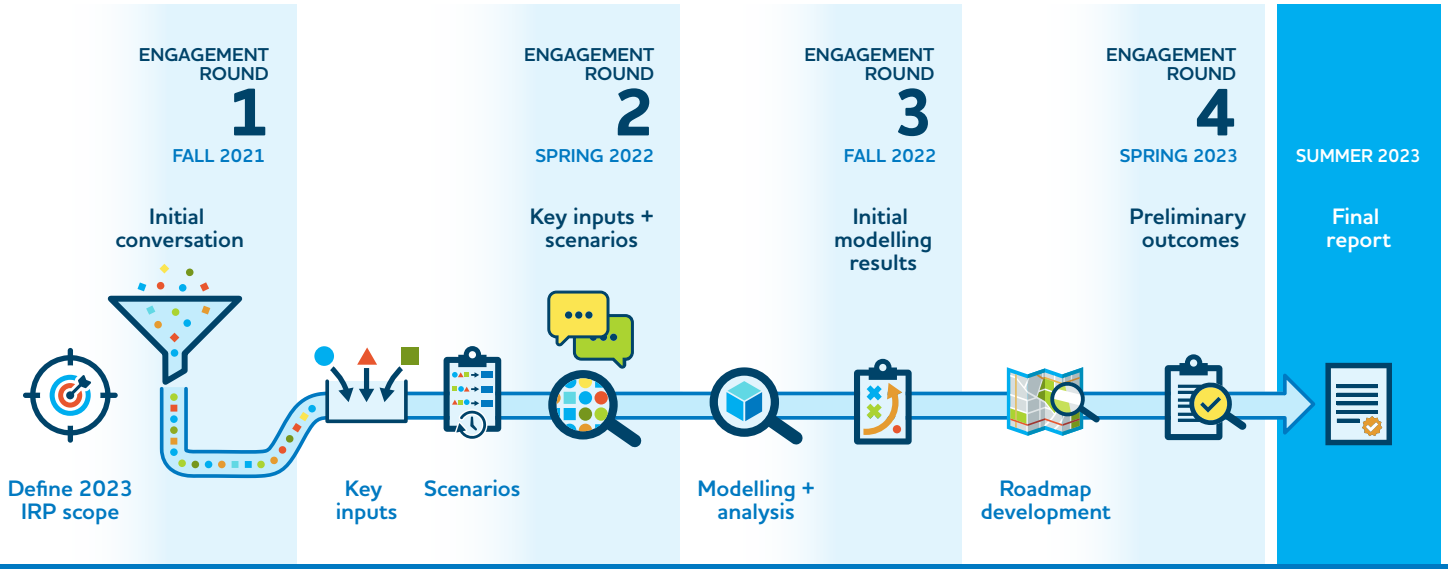

Figure ES-2 – 2023 IRP development and engagement processes

Since there are several ways the future may unfold, the outcomes of the 2023 IRP process allow for multiple approaches to respond to a broad range of futures. Rather than a specific development plan, the result is a road map that outlines steps to be taken now to help prepare to meet our customers' energy needs for the next 20 years and beyond.

2023 IRP ROAD MAP

The 2023 IRP road map is a representation of outcomes from more than two years of work. It is a planning tool to help us successfully navigate the energy transition.

LEARNINGS:
Knowledge gained from the process.

NEAR-TERM ACTIONS:
Actions over the next five years.

SIGNPOSTS:
Policy, market, technology, and customer trends and events.

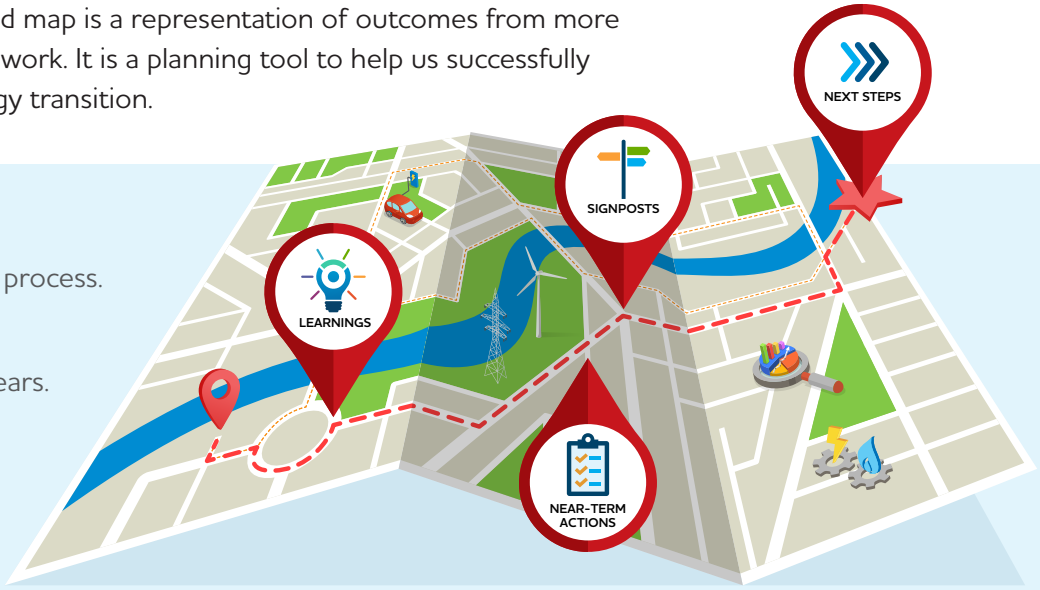

Figure ES-3 – 2023 IRP road map

The road map consists of six learnings, which are rooted in the results of the IRP work. They summarize key insights gained throughout the process from customer input and feedback, engagement, modelling and analysis, and understanding government policy. The learnings form the basis for five near-term actions, each with multiple sub-actions that identify the potential steps over the next five years to prepare for the energy transition. Four signposts are also identified for monitoring how the energy landscape is actually changing so we can understand if we need to adjust any near-term actions as we move forward.

2023 IRP LEARNINGS

The six 2023 IRP learnings are specific to this IRP and are likely to evolve with future IRPs.

We learned through this IRP that the energy transition is underway in Manitoba. Some customers are already making decisions to switch their current energy sources. The pace of change for this transition is uncertain. Managing the energy transition will be critical to ensuring Manitoba Hydro can continue to provide safe, reliable, and low-cost energy. The analysis of a broad range of future scenarios helped with understanding the potentially wide range of energy supply and delivery costs, greenhouse gas (GHG) emissions, resource mixes, and dates when new resources will be needed. Energy planning must continue to monitor and evaluate a broad range of scenarios, including pathways to net-zero GHG emissions. Energy policy will be a major influence on the pace of decarbonization and is an important tool to manage the energy transition. There is an opportunity to manage this transition to the benefit of all Manitobans and governments, Crown corporations, regulators, interested parties, and customers all have an important role to play.

LEARNINGS

1. The energy transition is underway in Manitoba.
2. Managing the energy transition will be critical to continue safe, reliable, and low-cost energy.
3. Investment is required in all scenarios.
4. Strategic use of natural gas assets and gaseous fuels are an integral part of the energy transition in Manitoba.
5. Analysis findings common to all scenarios can inform responses to an accelerated energy transition.
6. Future energy-related decisions will require complex considerations.

Figure ES-4 – 2023 IRP learnings

We learned that significant investment will be needed to support the energy transition, particularly as demand increases due to space heating and transportation electrification, and new resources could be needed within the next 10 years. While existing electricity surplus is currently sold in the export market, the 2023 IRP assumes firm export contracts expiring during the study period are not renewed and this electricity is redirected to meet Manitoba's needs. Increasing winter peak demand in all future IRP scenarios – up to two and a half times current demand – signals the need for new generation resources and the associated transmission and distribution infrastructure to deliver electricity to where it is needed. These investments will increase costs. The choices made on the technology and strategies

to serve and shape this demand will have significant impact on the cost and when new resources are needed. These decisions also become more complex as the energy transition occurs.

We also learned that some of the need for new investments could be mitigated through the strategic use of natural gas assets and fuels, while still enabling overall reductions in Manitoba's GHG emissions. For example, strategies such as using dispatchable thermal generation fueled by natural gas to support variable resources like wind, can be a low-cost way to support the electrification of transportation, resulting in a net decrease in overall emissions. In comparison, a future with more stringent restrictions on emissions from electricity generation, has a significant increase in costs and only marginal further reduction in overall emissions.

Firm export contracts are electricity sales that Manitoba Hydro is committed to fulfil at all times, similar to domestic needs. **Short-term opportunity sales**, based on water conditions and demand in the province, are expected to continue.

Modelling and analysis results demonstrate that as decarbonization efforts accelerate, so does the need to invest. Net present values over 20 years for the scenario and sensitivity results range from approximately $12 billion to nearly $27 billion, which is in addition to investments needed to maintain existing infrastructure. The impact to our customers' total energy costs from all sources, such as electricity, natural gas, and refined petroleum products requires further analysis.

The electrification of space heating would have a significant impact on winter peak demand, so strategies such as using dual fuel space heating systems could be a cost-effective way to meet peak demand by avoiding and potentially delaying some of the investment in new electricity resources.

There are also common observations across a range of modelling results that point to where some of the near-term future decisions can be made, particularly for an accelerated energy transition. In 20 years, most of our energy will still come from the electricity and natural gas assets that are in service today, so we must continue to invest in improving and maintaining them. Expanded or additional energy efficiency measures will also play a role in managing energy needs, with our modelling and analysis indicating that actions reducing electrical peak demand are most valuable. New resources will be required, with the IRP results indicating that wind is a cost-effective source for electricity, so long as there are also dispatchable capacity resources to complement its variability. Other resources, such as solar, were noticeably not selected in the analysis, while new hydropower was only selected in sensitivity analysis with significant load growth and significant restrictions on natural gas use.

The final learning is that future decisions around energy resources are complex and will involve factors beyond the reliability and low-cost objectives considered in this IRP. Further work is required to understand how to balance these additional factors – such as environment, climate, economic, and social considerations – when making energy resource decisions to best meet the needs of all Manitobans.

2023 IRP NEAR-TERM ACTIONS

To prepare for the future, the IRP identified five near-term actions. These actions are comprehensive and encompass the ongoing energy planning to prepare for a range of potential futures. Each action identifies multiple sub-actions with specific work to be completed over the next five years. Further work to detail the specific scope of each sub-action and prioritization of the sub-actions will be required as part of implementing the 2023 IRP road map. Knowing that new resources and significant new investment may be needed in the next 10 years, there is an urgency associated with some of the sub-actions in order to prepare for and manage the energy transition.

NEAR-TERM ACTIONS

1. Actively manage increasing winter peak load.
2. Pursue near-term options to be ready for potential rapid demand growth.
3. Develop options to reduce carbon content in natural gas.
4. Enhance integrated resource planning to address evolving needs.
5. Continue planning to meet the challenges of deep decarbonization.

Figure ES-5 – 2023 IRP near-term actions

The first near-term action addresses the potential challenges of increased winter peak load and emphasizes the importance of proactive management of peak electrical demand to ensure the continued provision of reliable and low-cost energy to our customers. Further exploration of the potential of dual fuel systems for space heating, particularly the feasibility of this technology in Manitoba, is a key focus. Another focus is collaboration with Efficiency Manitoba to pursue high value energy efficiency measures that maximize energy savings during peak demand times. We also want to better understand the value of demand response programs and potential rate design options that could reduce peak demand

The second near-term action positions Manitoba to be ready for rapid growth in electricity demand. This includes pursuing cost-effective opportunities to enhance supply from our existing hydropower stations and taking steps to reduce lead times for new resources. Work will begin to identify a range of resource development plans to meet customers' future needs, and more detailed analysis will be done for high potential resources identified in this IRP, like wind and dispatchable capacity resources. Strategies will be developed to modernize and expand the grid to enhance current operations and support future customer peak demand growth.

The third action is to develop options to leverage existing natural gas assets by using low carbon alternative fuels such as renewable natural gas (RNG) and hydrogen. Learning about blending these gases into the existing natural gas system is part of this action.

The fourth action to enhance our integrated resource planning acknowledges the uncertainty in the pace and direction of change and the value of ongoing conversations to prepare for a more complex energy future. Conversations will continue with the energy planning community to further develop and integrate engagement into the IRP process. There is also an opportunity for Manitoba, Manitoba Hydro, Efficiency Manitoba, and the Public Utilities Board, to align and work together in the best interests of Manitobans. We will also enhance our planning by developing a framework to evaluate total energy-related costs, studying the evolving role of energy markets and interconnections, and advancing detailed planning to reflect regional variations across Manitoba.

The fifth near-term action focuses on the work Manitoba Hydro needs to do now to address the challenges of deep decarbonization and be ready for significant changes in electricity and natural gas use. This includes understanding the impacts of integrating large amounts of variable renewable resources like wind into the electricity system, assessing potential hydrogen supply and direct-use, and continuing our investigation of longer-term energy storage. It also calls for further work to understand the role of technologies in earlier stages of development, such as carbon capture and storage and small modular reactors, and their potential feasibility in Manitoba.

As the energy landscape continues to change, our energy planning will adapt, and these actions will be prioritized accordingly.

2023 IRP SIGNPOSTS

The 2023 IRP road map includes four signposts serving as indicators of changes in the energy landscape in Manitoba. The four signposts are government actions, customer decisions, zero emission vehicles (ZEVs), and technologies and markets. Monitoring these signposts will inform decision-making and allow for timely adjustments to the road map. It will enable Manitoba Hydro to navigate the evolving energy landscape, prioritize actions, and help ensure we can continue to supply the electricity and natural gas customers need well into the future. These signposts will be further developed as the road map is implemented.

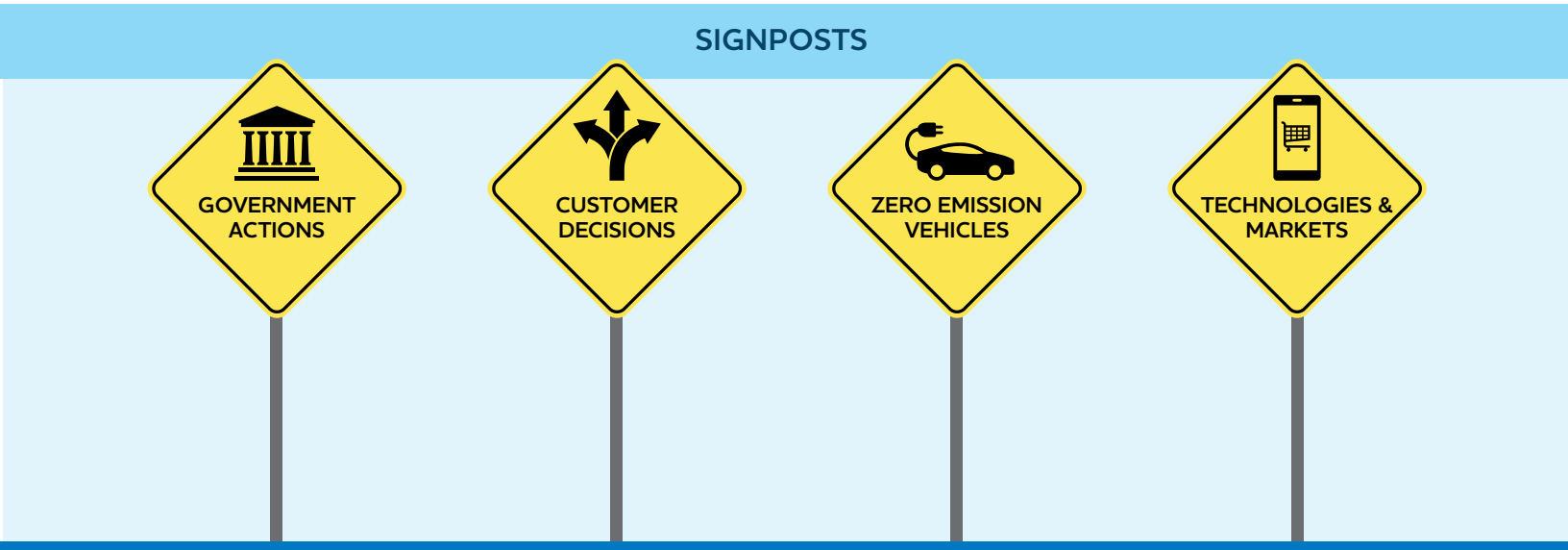

Figure ES-6 – 2023 IRP signposts

The government actions signpost encompasses actions taken – such as providing incentives or establishing regulations – by federal, provincial, and municipal governments, as well as regulators and international bodies. These actions can influence the supply, demand, or price of energy, including the pace and scale of decarbonization and customers' energy-related decisions.

Monitoring and anticipating customer decisions is vital to planning for the supply and delivery of electricity and natural gas to meet customers' needs. Different types of customers will consider and weigh factors like upfront capital and operating costs, climate change mitigation and adaptation, resiliency, and other factors differently in their energy-related decisions. Monitoring and understanding the factors behind those decisions can help Manitoba Hydro prepare to continue meeting our customers' changing needs.

The ZEVs signpost focuses on the factors influencing the adoption of ZEVs like charging or fueling availability, driving range, upfront costs, total cost of ownership, and availability of vehicles. Monitoring these factors provides insights into the related changes in energy use, including changes in the type of energy used, the pace of the change, and when and where the change is occurring.

The technologies and markets signpost includes: the technologies used to produce, deliver, or store energy; the production and supply of renewable fuels; and, changes in wholesale markets and energy price forecasts. This signpost will ensure that energy planning reflects current information on emerging technologies and market dynamics.

CONCLUSION

The 2023 IRP road map outlines the first steps that we need to take to prepare for the energy transition. Implementing the road map will start immediately, first by developing specific plans and schedules for the near-term actions and monitoring the signposts. We are committed to transparency in this process and will communicate the progress of near-term actions, monitoring of signposts, and outcomes from any new analysis required when material changes occur in the energy landscape. The exact timing of these communications will be determined with consideration to the pace of change.

While there is still much uncertainty in what the future will be, or how fast change will happen, the work done through this first IRP has established a foundation, a repeatable process, Manitoba Hydro can use to plan for that change. We will continue to evolve our IRP development process to ensure it is aligned with the changing energy landscape. And, we will continue to further develop our engagement and build the energy planning community so we can work together to manage the energy transition for the benefit of all Manitobans.