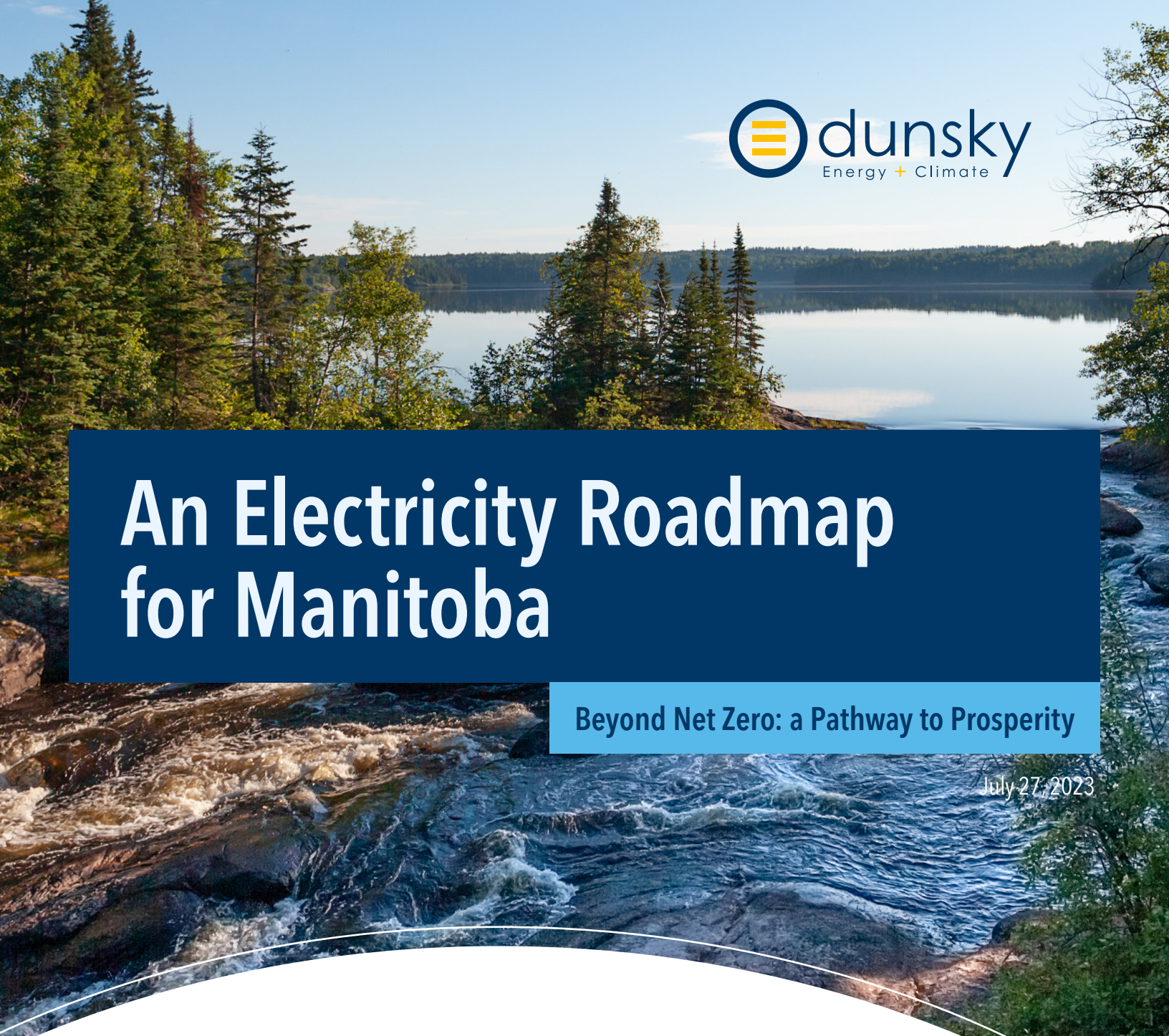

dunsky
Energy + Climate

An Electricity Roadmap for Manitoba

Beyond Net Zero: a Pathway to Prosperity

July 27, 2023

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Note to Reader

The Government of Manitoba initially retained Dunsky Energy + Climate Advisors (hereafter "Dunsky"), through competitive procurement, to develop a holistic Energy Policy Framework for the province.

Since presenting the original draft framework report, critical new information -- in particular strong interest by industrial project proponents in Manitoba's clean electricity, as well as a clean electricity focused federal budget -- arose. In light of that new information, the Economic Development Board of Cabinet tasked Dunsky with a second phase of work: developing an Electricity-specific Roadmap for the province, with heightened emphasis on economic development opportunities.

This roadmap builds on the extensive work conducted in phase 1, including comprehensive energy modelling, research into strategy and policy options, and engagement with stakeholders.

Additional engagement rounded out this second phase work: while many were involved, we would like to thank in particular Michael Swistun, Secretary of the Economic Development Board; Sandy Riley, advisor to the Premier; Jay Grewal and Edward Kennedy, respectively CEO and Board Chair of Manitoba Hydro; and Colleen Kuruluk, CEO of Efficiency Manitoba.

The views and recommendations herein are those of Dunsky Energy + Climate Advisors alone.

About Dunsky

Dunsky supports leading governments, utilities, corporations and across North America in their efforts to accelerate the clean energy transition, effectively and responsibly.

With deep expertise across the Buildings, Mobility, Industry and Energy sectors, we support our clients in two ways: through rigorous **Analysis** (of technical, economic and market opportunities) and by designing or assessing **Strategies** (plans, programs and policies) to achieve success.

Executive Summary

The world of energy is rapidly changing. Clean energy is growing exponentially, driven by falling costs, technology innovation, and the drive to net zero emissions. Investors and companies are racing to take advantage of this growing market - and governments are competing to attract the trillions of dollars of capital that will be needed over the coming decades.

Manitoba is ideally positioned to benefit from this opportunity. It has one of the cleanest and lowest cost electricity grids in the G7, and abundant critical minerals, wind and other transition resources. Industry interest is now clear, with growing demand for clean power to support new economic activity. If managed well, the transition could bring enormous economic opportunities to Manitoba, while supporting Indigenous reconciliation, improving energy security and affordability, and reducing GHG emissions.

However, the transition is not without challenges. Growing demand for electricity means that the days of surplus power will soon be a thing of the past. Manitoba will need to roughly double the size of its electricity system within a generation - all while keeping costs down and ensuring a reliable and resilient grid. Compounding this challenge, Manitoba Hydro, the province's Crown utility, now carries a significant debt load, putting some constraint on its ability to make needed investments going forward.

This document provides a roadmap for Manitoba to secure its vision of a growing economy powered by clean, affordable electricity. It focuses on three pillars for bold and coordinated action:

1. Grow Manitoba's supply of emissions-free electricity
2. Save and shift electricity use to free up valuable energy and capacity
3. Modernize governance and institutional mandates to enable these changes

The roadmap provides detailed recommendations to achieve these objectives. These include:

- **Create the "Manitoba Energy Savings Authority (MESA)"**, building on the current Efficiency Manitoba, with responsibility for a whole-of-government approach to saving energy, capacity and related GHG emissions.
- **Create an Electricity Task Force** to enable greater coordination and collaboration between government, Manitoba Hydro, and MESA/Efficiency Manitoba as they work to implement the recommended changes.
- **Update and expand the mandates** of Hydro, MESA/Efficiency Manitoba and the Public Utilities Board (PUB) to align with the needs of a rapidly growing and clean electricity system.
- **Maintain Hydro's central role as Crown-owned utility** while enabling a greater role for third-party power providers, including Indigenous organizations.

Implementing these changes will require bold, coordinated leadership by the Government of Manitoba and other provincial stakeholders. Although challenging, we believe they are necessary to maintain and enhance the province's competitiveness in a fast-changing world while addressing climate change head on.

And the benefits for Manitobans will be long-lasting: a modernized electricity system that creates jobs and economic opportunities, reduces household energy bills, supports Indigenous reconciliation, and reduces emissions across Manitoba's economy and beyond.

1. The Manitoba Advantage

Introduction: The Race to Clean Energy

The world of energy is rapidly changing.

For more than a decade now, a once-a-century economic transition has been underway, as the world races against the clock to embrace cleaner sources of energy. And as the early impacts of climate change are increasingly felt around the world and here at home[1], that race has been put into overdrive.

In the last year alone, governments have responded with truly historic commitments, as they seek to both address climate change and position their economies for a carbon-competitive future:

- The **US Inflation Reduction Act**, passed in August 2022, contains at least US $400 billion of federal tax incentives for clean energy technology manufacturing and deployment. As of mid-July 2023, the IRA had already attracted $73 billion in private sector clean energy technology investment to the US.[2]
- The **EU's Green Deal Industrial Plan** aims to position the continent as leading the low-carbon industries of the future, including critical minerals, renewable energy technologies and hydrogen, all while meeting its own aggressive emissions targets.
- In response, **Canada's 2023 federal budget** dedicated $70 billion to clean electricity and clean growth.[3]

The private sector has responded in kind. According to the International Energy Agency, Global clean energy investment is forecast to exceed US $1.7 trillion in 2023 – a 50% increase from 2018 – and account for 90% of new energy development this year. By 2030 the clean energy market is expected to nearly triple again, to US $4-5 *trillion per year.*[4]

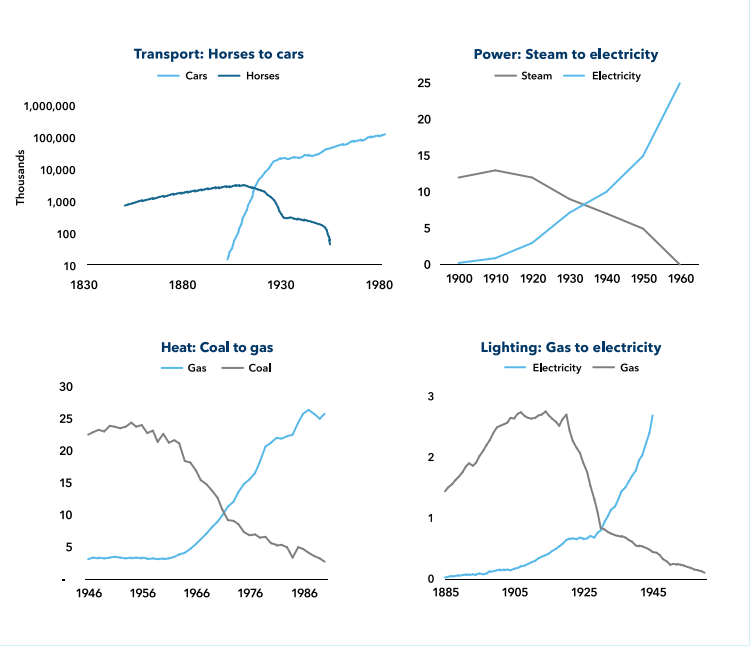
Companies and investors are racing to take advantage of this market opportunity. And governments are racing to position their economies to attract the large capital investments – notably related to clean energy – that will flow from it. Nearly half of the world's biggest companies have now adopted net-zero emissions targets, covering one-third of global market capitalization.[5] Investors and lenders with assets of $70 trillion have committed to align their portfolios with net zero, including all six of Canada's largest banks.[6] And hundreds of companies have now committed to 100% renewable electricity to power their operations.[7]

1 June 2023 was the hottest month ever recorded, with July expected to shatter that record. Wildfires in Canada had already burned 11 million hectares by mid-July, more than seven times the 10-year average, displacing more than 150,000 Canadians. Smoke from Canadian fires has forced millions indoors, and outdoor sports events have been cancelled as the risk to human health grows. At the same time, hundreds of millions of people across North America and Europe were living under extreme heat advisories.
2 https://www.jackconness.com/ira-chips-investments
3 https://climateinstitute.ca/budget-2023-balances-policy-and-programs-with-payments-to-support-clean-growth/
4 IRENA, 2023; IEA, 2021
5 https://zerotracker.net/
6 https://cba.ca/banks-in-canada-committed-to-a-net-zero-economy-by-2050
7 https://www.there100.org/

Lessons From Past Energy Transitions

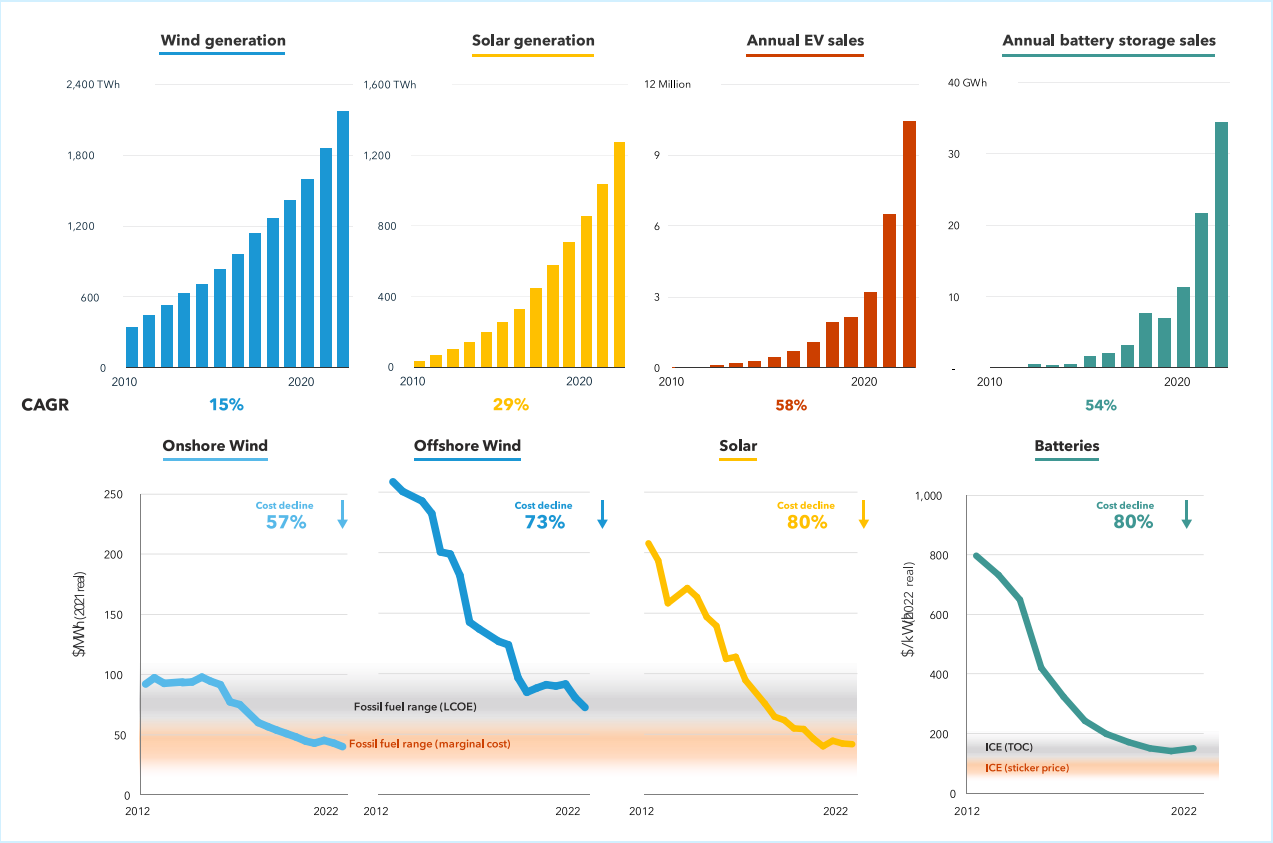
Past energy transitions occurred over decades and were driven by shifts in demand and technology. Examples include the transition from horse-drawn carriages to cars, from gas to electric lighting, and others (see chart on the right).

The current transition is happening on a faster timescale, and is driven by the global imperative to decarbonize by the middle of this century. Like previous transitions, innovative technologies are on an exponential growth curve, driven by rapidly falling costs and economies of scale (see chart below).



The resulting shift offers historic opportunity to those who can anticipate and adapt to change. But it also poses significant risk – of stranded assets or uncompetitive economies – to those who hold back.

Source: RMI, 2023



Leveraging Manitoba's clean low-cost power

Manitoba is extraordinarily well-positioned to lead in the energy transition. Thanks to its historic investments in clean electricity, it can now boast one of the cleanest power grids in the world, and some of the lowest power prices among G7 countries. This combination – low-cost and low-carbon – is a critical competitive advantage in the emerging, low-carbon economy.

Figure 1. Manitoba's electricity system is one of the cleanest in the world

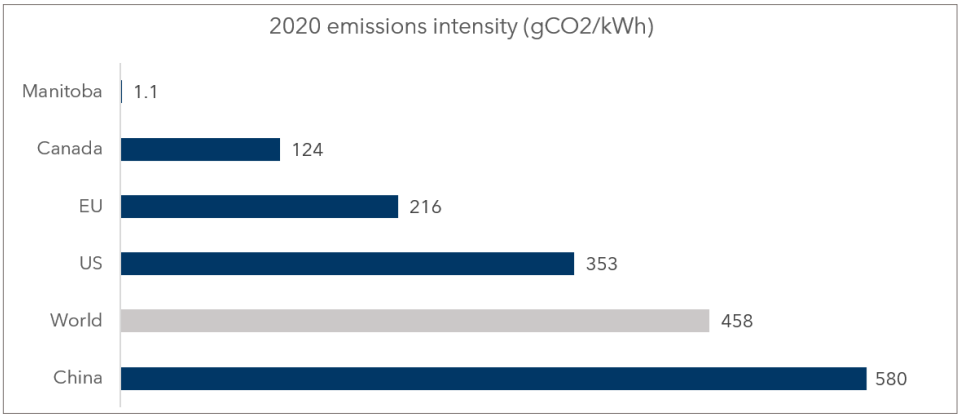
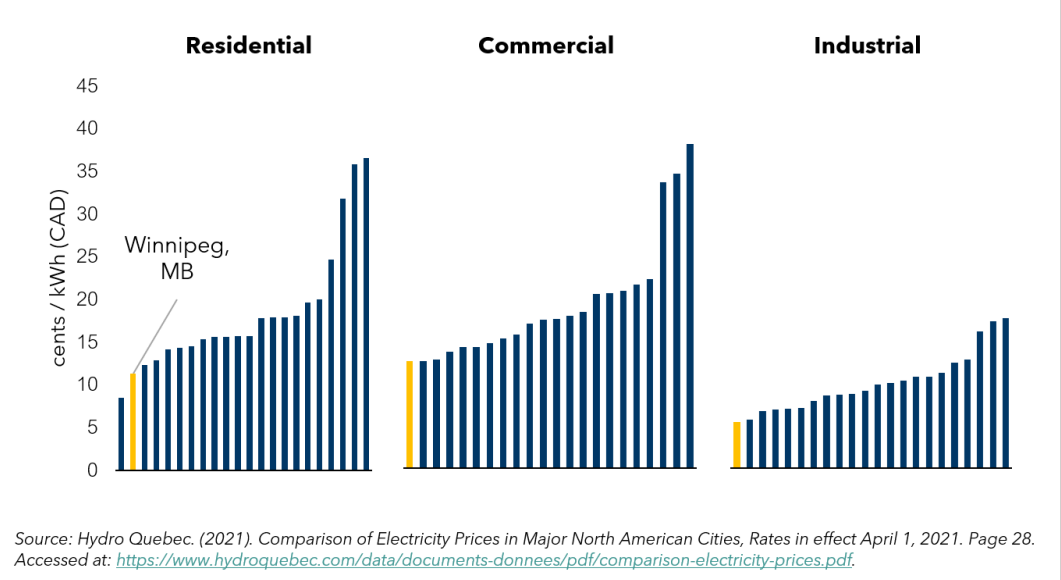


Figure 2. Manitoba's electricity rates are among the cheapest in North America



Source: Hydro Quebec. (2021). Comparison of Electricity Prices in Major North American Cities, Rates in effect April 1, 2021. Page 28. Accessed at: https://www.hydroquebec.com/data/documents-donnees/pdf/comparison-electricity-prices.pdf.

It should come as no surprise, then, that Manitoba is beginning to see that advantage materialize: as of mid-July 2023, the province had a pipeline of 18 new large industrial projects interested in locating in Manitoba, seeking a combined 4,400 MW of clean, low-cost power. If all were to be approved, these would bring tens of billions of dollars of investment and economic benefits to the province.[8] This interest comes from a wide range of sectors, including critical minerals, renewable energy manufacturing, low-carbon hydrogen, sustainable aviation fuel, and semiconductors.

8 Not all projects will materialize, notably because of the limits of the current power grid – see the next section. Yet we anticipate these to be the tip of the proverbial iceberg.

Manitoba's Clean Economic Development Opportunities

Investment is set to flow into Manitoba due to its abundant, clean, low-cost electricity. The government is in advanced talks with two clean energy projects – a solar manufacturing facility and sustainable aviation fuel facility – that represent nearly $1 billion of investment and would generate billions of dollars in economic impacts and hundreds of jobs. This is the tip of the iceberg, with the government in talks with 18 energy-intensive projects with a cumulative electricity demand of 4,400 MW.

The economic opportunities for Manitoba span multiple sectors, including:

- Critical minerals: Manitoba has deposits of 29 of the 31 critical energy transition minerals, including nickel, lithium, copper and rare earth metals. Mining companies have already announced expansion plans based on access to clean power.
- Low-carbon hydrogen production: Manitoba has two green hydrogen projects in the early phases, and due to its non-emitting electricity can qualify for the highest tier of the federal Clean Hydrogen Investment Tax Credit.
- Agricultural technology: Manitoba has seen large investments in alternative proteins and the domestic agricultural technology sector.

In addition to attracting new investment to the province, modelling presented in Dunsky's draft Phase 1 report found that electricity sector jobs stand to grow substantially in Manitoba as consumers across all sectors switch to electric heat pumps, vehicles and industrial processes.[9] Other modelling has found similar results.[10]

Beyond the economic opportunities, the transition will bring other benefits for Manitoba:

- **Indigenous partnerships:** the drive to clean electricity represents an opportunity to advance reconciliation and provide tangible benefits to Indigenous communities in Manitoba. Indigenous participation and free, prior and informed consent (FPIC) are essential to many clean energy projects. Indigenous partnership, including equity participation and/or leadership, is increasingly the norm, creating jobs and benefits for many First Nations communities across Canada, while also providing cleaner air by supporting the transition away from diesel. Federal funding now makes Indigenous participation in clean energy projects more accessible than ever.
- **Energy stability and affordability:** Manitoba residents who switch from fossil fuels to clean electricity technologies can benefit in two ways (see Energy Affordability box): cost savings from using more efficient technologies, such as electric vehicles (which use three times less energy per 100 km) and heat pumps (which are up to three times more efficient than gas or baseboard heating); and less exposure to volatile prices, including price swings at the pump.
- **Made-in-Manitoba clean energy:** the province will benefit from an improved trade balance as it shifts from imported fossil fuels (which currently make up 70% of energy use) to clean, domestically produced electricity. This means more money staying in Manitoba, rather than flowing out of the province.

Despite these theoretical benefits, Manitoba cannot simply take clean energy investment for granted. As we'll see below, **the province no longer has surplus power to draw on**, a situation that requires urgent and bold action if it is to leverage its strength as a competitive, low carbon economy.

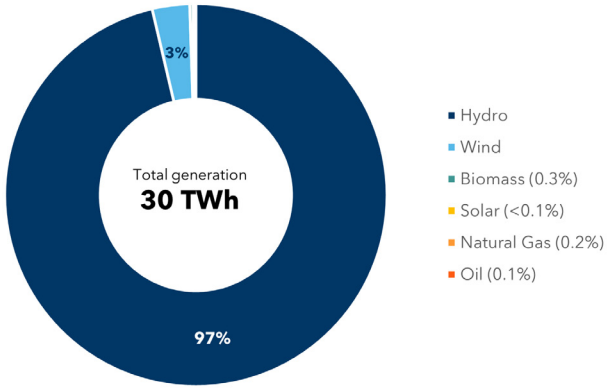
9 Dunsky, Draft Phase 1 Energy Policy Framework for Manitoba, 2023
10 Clean Energy Canada and Navius, A Pivotal Moment, 2023

2. Manitoba's Challenge

To leverage its clean power strengths, Manitoba must address and overcome several challenges. The most important of these is the need to meet rapidly growing demand for clean electricity.

In 2021, Manitoba produced about 30,000 GWh of electricity: 97% from hydro, 3% from wind, and the remainder from biomass, natural gas, and oil.[11] To produce this power the province has about 6,200 MW of installed capacity. Since 2005, thanks to investments in hydropower, wind generation, and transmission, Manitoba's electricity grid emissions have fallen more than 90%, from 10 grams/kWh to around 1 g/kWh in 2020. Today, Manitoba has without a doubt one of the cleanest electricity grids in the world.

Figure 3. In 2021 Manitoba generated 30 TWh of electricity, with more than 99% from non-emitting sources.

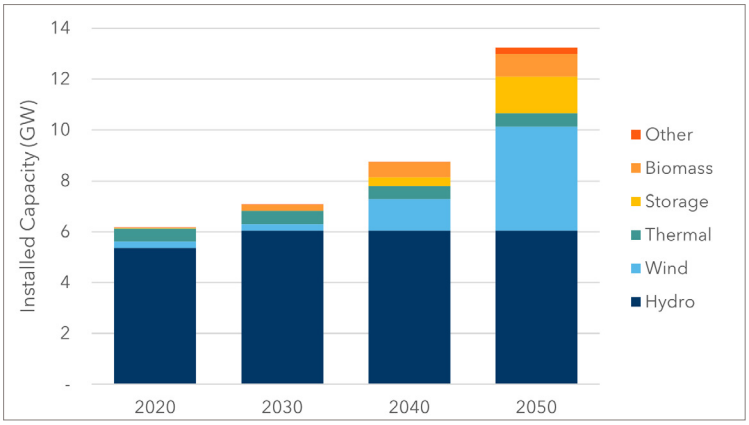


Source: Canadian Energy Regulator

Modelling presented in Dunsky's draft Phase 1 Framework report estimates that by 2050, generation will need to grow by at least two-thirds, and installed capacity by almost double, to 13,000 MW.[12] [13]

In Dunsky's analysis, which imposes a non-emitting constraint to maintain the province's clean power advantage, most growth would be met by wind power – a renewable, low cost and proven source of generation – with key roles for hydropower (both in generating and storing electricity), energy storage, and biomass.[14] Under this scenario, electricity grows from providing around one-quarter of Manitoba's energy needs to over 50%, driven by industrial demand and adoption of electric vehicles, heat pumps, and other low carbon technologies.

Figure 4. Manitoba's electricity system will need to more than double to power growth, reduce emissions and electrify other sectors.



Source: Dunsky, Draft Phase 1 Energy Policy Framework, 2023

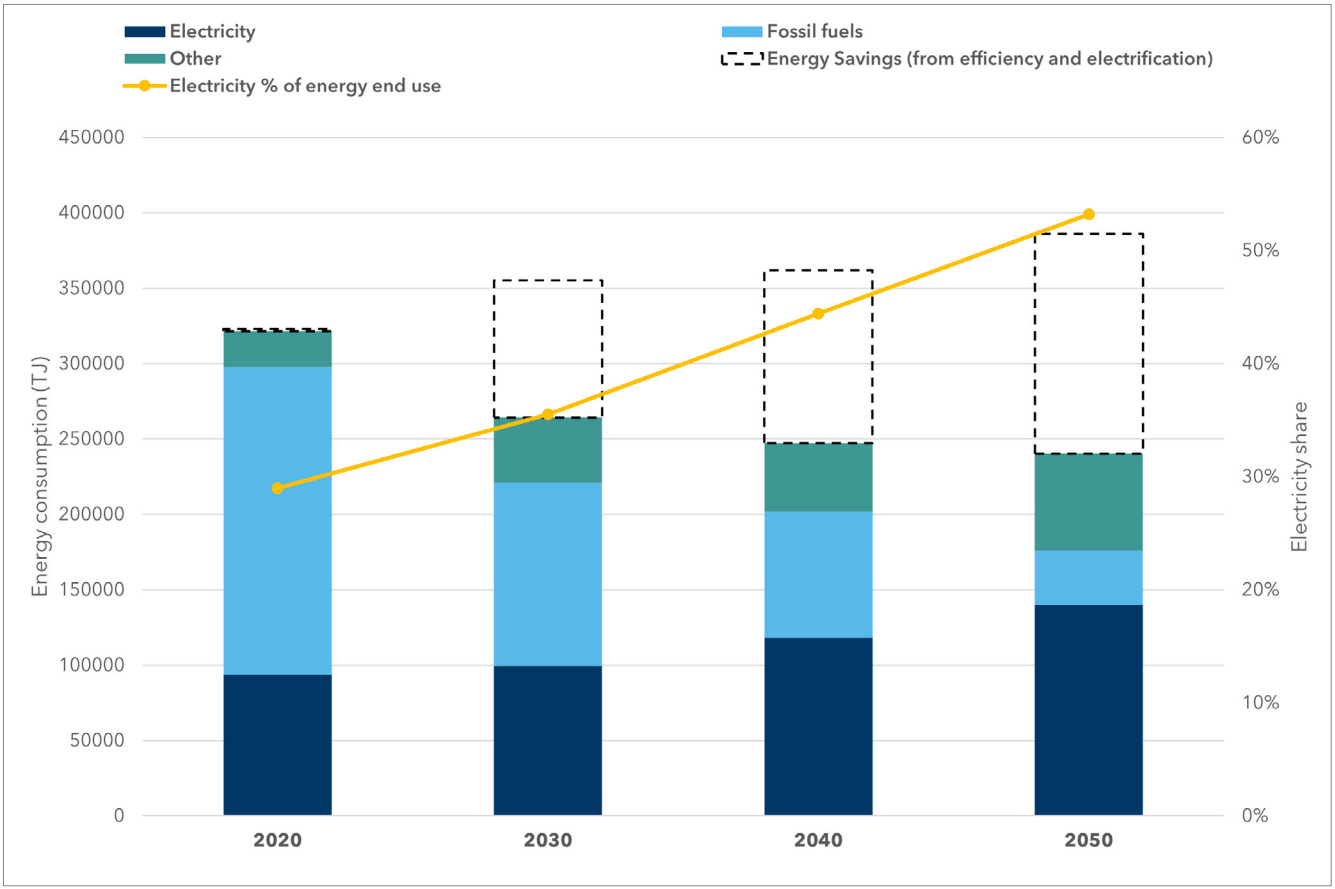
11 Canadian Energy Regulator, https://apps.cer-rec.gc.ca/ftrppndc/dflt.aspx?GoCTemplateCulture=en-CA
12 This takes into account the Keeyask Generating Station which came into service in March 2022.
13 Other scenarios are broadly aligned, directionally, with Dunsky's assessment. Manitoba Hydro's forthcoming Integrated Resource Plan (IRP) forecasts capacity needs growing faster, to between 12,000 and 16,600 MW by 2042 (between 90% and 170% larger than today); differing assumptions, notably regarding the extent of efforts to increase energy efficiency, may explain some of the gap. Under its Canada Net Zero scenario, the Canadian Energy Regulator projects somewhat slower growth in Manitoba, with demand reaching 10,764 MW.
14 In this respect, Dunsky's analysis differs from that of Manitoba Hydro's draft IRP.

Meeting this challenge will require multibillion dollar investments to both expand supply and modernize Manitoba's electricity grid. While large, these costs are expected to be exceeded by the benefits – both to the economy in terms of investment and growth, and to consumers in terms of lower overall energy bills (not just electricity – see below), reduced price volatility, greater comfort and lower emissions.

Given Manitoba Hydro's high levels of debt, managing these costs sustainably will be critical to a smooth transition. This roadmap calls for a **twin focus on saving electricity** – both energy and capacity – **and building out new supply.**

This roadmap also recommends changes in power system governance, most notably providing for an enhanced energy savings authority, and a greater role for non-utility generators to provide electricity (including Indigenous communities and independent power producers).

Figure 5. Electricity's share of the energy system will grow substantially, but total energy use – and likely bills – will fall as Manitobans switch to more efficient, electric-powered technologies.



Source: Dunsky modelling from Draft Phase 1 Energy Policy Framework, 2023

Figure 6. Opportunities and Challenges for Manitoba's Electricity System Transition

Opportunities	Challenges
► **Clean power advantage:** Manitoba's system is 99% non-emitting and is more competitively priced than almost all other North American jurisdictions. ► **Industry interest:** Manitoba is facing unprecedented demand for its low carbon, low cost electricity, with current industrial requests totalling 4,400 MW, and further requests expected. ► **Federal support:** billions of dollars are available for independent power producers (IPPs), Crown corporations and Indigenous organizations to develop clean power, storage and transmission projects. ► **Customer bill savings:** residents could see overall energy spending drop as they switch from fossil fuels to vastly more efficient electric equipment to power their homes and vehicles. ► **Indigenous reconciliation:** Manitoba has a unique opportunity to advance reconciliation by partnering with Indigenous communities to meet future clean energy needs.	► **Massive system growth**: Manitoba's electricity system will need to roughly double in size to meet future demand and power the province's economic growth and carbon reductions. ► **Fiscal challenges**: Manitoba Hydro (MH) holds high levels of debt, representing 86% of total capitalization (among the highest of any Canadian utility). ► **Outdated governance**: Manitoba's electricity governance framework and its institutions were created in a different era and context, and need to be updated and aligned with the needs of the energy transition. ► **Global competition**: Manitoba is not the only jurisdiction trying to attract clean energy investment. It faces stiff competition from other Canadian provinces, the US, and jurisdictions around the world.

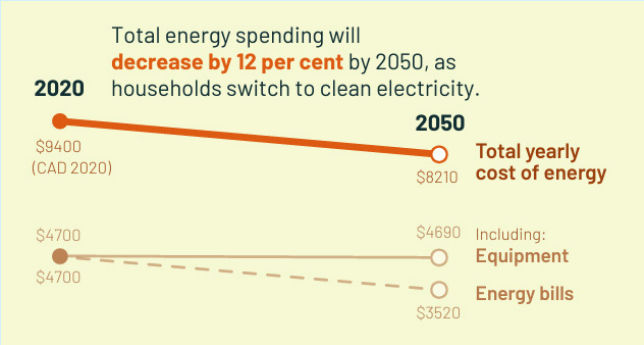
AFFORDABILITY: How Will the Transition Affect Energy Costs for Manitobans?

Despite past investments, Manitoba's electricity remains among the lowest cost in North America for commercial and residential customers. This makes Manitoba an attractive destination for companies looking to expand their operations and meet climate and ESG commitments. Low prices can also encourage residents to electrify their homes and vehicles.

Energy affordability must continue to be a priority as Manitoba makes the large investments needed to modernize and expand its electricity system.

A growing number of studies has found that the shift to a more electrified, low carbon economy will have broad benefits on energy affordability. For example, a recent Canadian study found that by 2050, **total spending on energy would *fall* by 12%** across Canada under a net zero emissions scenario, despite higher electricity rates (in Manitoba's case from 10.8 to 13.2 c/kWh, by 2050).[15]

Net impact of the switch to electricity across Canada



Falling energy costs are driven by two factors: (1) electric vehicles, heat pumps and other technologies are *multiples* more efficient than fossil fuel alternatives, meaning that customers save over the life of a product (e.g., EV owners could save up to $18,000 over eight years, even accounting for higher purchase costs relative to a gas-powered vehicle);[16] (2) switching to clean, domestically produced electricity reduces exposure to fossil fuel imports which are characterized by high price volatility (e.g., gasoline price spikes following Russia's invasion of Ukraine).

This means the **switch to clean electricity is a win-win-win for Manitoba**: greater energy security, more spending remaining in the province, and cost savings for residents. This has several implications:

1. The costs and benefits will likely be distributed unevenly, with lower-income households facing barriers to switch to efficient clean alternatives. This calls on the province to **ensure that vulnerable populations receive supports to enable them to make the switch** despite higher up-front equipment costs.
2. The cost of meeting growing electricity needs can be kept lower by a concerted effort to reduce electricity waste and shift use to off-peak periods. New programs and updated codes and standards will enable Manitobans to save more electricity and limit Hydro's cost of service.
3. The choices that Manitoba makes in adding new electricity supply will impact future affordability. **Clean and renewable sources of generation are now competitive or even cheaper than fossil fuel alternatives**, and these costs are expected to continue to fall further. The Canadian Energy Regulator expects wind and battery storage costs to decline by 12% and 58%, respectively, from now to 2050 under its Canada Net Zero scenario.

15 https://climateinstitute.ca/reports/electricity/
16 https://cleanenergycanada.org/report/the-true-cost/

3. Manitoba's Clean Electricity Roadmap

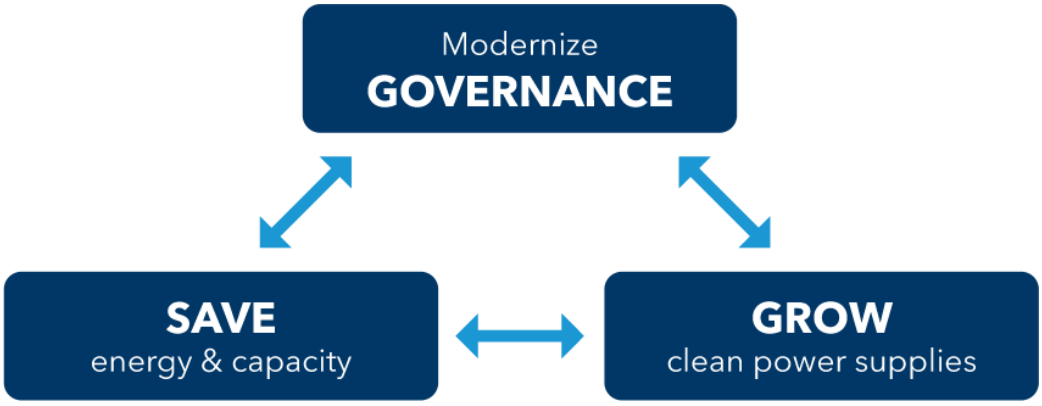
Going forward, Manitoba cannot rest on itrs laurels. Leverage its strengths, the province will require bold action to both maintain and enhance its clean electricity advantage.

The benefits are five fold:

- **create new, well-paying jobs** in construction and maintenance of clean energy infrastructure;
- **attract foreign investment**, building additional jobs, tax revenue and prosperity in the process;
- **replace imported fuels with made-in-Manitoba power**, improving balance of trade by keeping more money in the pockets of Manitobans and their communities; and
- **reduce Manitobans' total energy bills** *and* exposure to volatile prices, including at the pump, by switching to highly efficient, stably-priced electricity.
- lower air emissions, enabling cleaner air now and a healthier climate for future generations, among other benefits.

To ensure Manitobans can seize these benefits, we recommend action along three fronts:

1. **GROW** the province's supply of clean, emissions-free electricity.
2. **SAVE** and shift electricity use to free up valuable energy and capacity; and
3. Modernize **GOVERNANCE** and mandates of key provincial institutions to support these priorities.



PILLAR 1: Modernize GOVERNANCE

To effectively execute on the Grow + Save agenda we propose, we must first align the governance of Manitoba's key institutions.

Diagnostic: Electricity Governance not Aligned with Economic and Climate Goals

The electricity landscape in Manitoba is comprised primarily of three para-governmental entities:

Manitoba Hydro, a Crown Corporation with a natural monopoly on the transmission and distribution of both power and gas in the province; it also produces the lion's share of Manitoba's electricity, primarily through hydropower. Hydro holds some $30B in assets; approximately 80% of its annual cost is dedicated to its electricity activities. We note that:

- Hydro has taken on **large debt** in recent years, as a result primarily of the Keeyask hydro electric project, putting significant financial pressure on the utility.[17]
- At the same time, Manitoba will require **significant additional investment** in power generation, transmission and distribution as it grapples with rapidly growing demand arising from the needs – and opportunities – of the clean energy transition.
- Hydro's mandate does not currently include **emissions reduction** targets, despite electricity being the single most important tool to the province's ability to achieve net zero emissions and compete in a carbon-constrained world.
- Hydro's **board of directors** has undergone turmoil in recent years, with concerns raised regarding its ability to provide independent oversight; we also understand that board members serve in near-volunteer positions and with limited support resources.

Efficiency Manitoba was created in 2017 with a mandate to implement demand-side management initiatives to reduce electricity and natural gas use. It has an annual electricity savings target of 1.5% and a budget of $76 million (of which $51 million is for its electric portfolio).[18]

It has become apparent that alone and in its current form, Efficiency does not have all the tools needed to secure the full extent of savings opportunities for the province:

- The agency is not empowered to deliver electrical **capacity savings**, unless specifically asked to do so by Hydro.
- The agency is not empowered to deliver **fuel savings** other than electricity and natural gas, despite large opportunities and economic benefits.[19]
- The agency is not empowered to define **regulatory action** such as codes and performance standards that are essential to ensuring long-run, cost-efficient savings.[20]
- Other agencies and Crown corporations have no **obligation to consult** the agency on matters pertaining to energy savings, nor to lead by example on energy performance of their assets

17 In fiscal year 2021-22, financing costs rose 27.4% over the previous year, to over $1 billion.
18 http://www.pubmanitoba.ca/v1/proceedings-decisions/appl-current/pubs/2020-em-3-yr-plan/em-report-final-feb-2020.pdf
19 With the small exception of limited funds from the previous Affordable Energy Fund.
20 Responsibility for building codes, including their energy component, resides with the Ministry of Labour and Immigration.

Manitoba Public Utilities Board (PUB), the independent regulator whose powers were recently adjusted, and which now oversees Manitoba Hydro's rates, and reviews Efficiency Manitoba's three-year plans and progress towards efficiency targets. The PUB's oversight is limited compared to most Canadian jurisdictions; it does not review Hydro's major investment decisions nor does it oversee capital expenditures or transmission tariffs.

- The PUB currently provides for a **multi-year approval process**, in line with modern regulation.
- Like Hydro, the PUB is **not currently mandated to ensure emissions reductions**, despite the energy sector being at the core of emissions reductions in the province.
- The PUB has **limited in-house expertise** and financial resources, creating a risk for the pace of investment approvals needed in the coming years to ensure a reliable, affordable and zero emissions energy future.

Findings: Governance Should Evolve to Support Growth, Enhanced Savings, and Climate Goals

Manitoba enjoys significant benefits from its current electricity governance, and we do not find a need for wholesale change. However, the energy transition underway does require a degree of change to modernize the sector and ensure it is able to deliver, efficiently and effectively, on its economic and environmental promise. We recommend three pillars of governance-related change:

- **Strengthen the province's ability to save energy** through a whole-of-government approach centered around expanding Efficiency Manitoba's powers and renaming it the Manitoba Energy Savings Authority.
- **Enable growth in clean power supplies**, and reduce the burden on Hydro's finances, by turning toward independent power producers (IPPs), Indigenous-owned projects, and customer-side generation, while securing federal government contributions.
- **Update agency and Crown mandates** to align with the three-legged stool of 21st century energy goals: preserve affordability, ensure system reliability, and achieve net zero emissions.

The following recommendations are designed to secure these changes and adapt Manitoba's electricity governance for the challenges ahead:

Recommendations: Electricity Task Force

Manitoba is in an enviable position insofar as decisions affecting its electricity sector are made by a relatively small number of players: Government of Manitoba, Manitoba Hydro (MH), Efficiency Manitoba/MESA, and the Public Utilities Board (PUB). Still, the risk of entities working on related matters inefficiently and/or at cross purposes remains present.

1. **Form a permanent, decision-level Electricity Task Force** to coordinate on key areas of shared or potentially competing jurisdiction. The Task Force – comprised of government (Ministries of Economic Development, Investment and Trade; and Environment and Climate), Manitoba Hydro and Efficiency Manitoba/Manitoba Energy Savings Authority[21] – would meet regularly to raise and/or address concerns, and to ensure a coordinated approach to the Grow + Save agenda.[22]
2. **Develop and implement a framework for industrial energy use.** The "first come, first served" framework used in the past to approve industrial projects should be revised and updated for Manitoba's new context. A priority for the new Task Force is to develop an updated framework to assess and approve major new industrial load requests, to include: (1) economic, social, and environmental criteria, to ensure the project

21 As Hydro's and EM's independent regulator, it would be inappropriate for the PUB to be part of the task force.
22 The Task Force should consult with Indigenous communities, as well as other key stakeholder groups, as it implements these and other changes.

contributes to provincial objectives; (2) best-in-class energy performance conditions to ensure the highest levels of energy efficiency and load flexibility; and (3) flexibility to apply rates more reflective of marginal cost than of historic cost.

Recommendations: Manitoba Energy Savings Authority (MESA)

A whole-of-government approach, led by a single authority, is clearly needed if Manitoba is to leverage its full potential for energy, capacity and related GHG savings. This approach must ensure that all relevant tools are accessed: expanded voluntary programs to encourage efficiency, demand response and adoption of other customer demand-side energy resources (DERs); updated building codes, building performance standards and other rules that set a high bar for energy performance; time-varying rates to encourage off-peak electricity use;[23] and enabling strategies including low-cost financing, training and workforce development, and more.

In implementing the recommendations below, Government, EM and Hydro should work together – through the Electricity Task Force once established – to address specific details around MESA's reporting structure, regulatory powers, GHG emission reduction responsibilities, necessary staffing levels, and more. In addition, care should be taken to minimize disruption to current Efficiency Manitoba activities, including by maintaining the current market-facing brand.

3. **Designate the current Efficiency Manitoba as the province's new Manitoba Energy Savings Authority.** MESA's responsibilities should include:
   - *Oversee and report* on the province's Whole-of-Government approach to maximizing energy, capacity and related GHG savings across all energy sources.[24]
   - *Deliver voluntary programs*, under the Efficiency Manitoba brand, to achieve energy, capacity and related GHG savings.
   - *Define performance regulations* including in building codes, building performance standards, other regulations and compliance mechanisms necessary to maximize energy, capacity and related GHG savings in Manitoba.
   - *Promote other DERs*, in collaboration with Manitoba Hydro wherever relevant (see Hydro recommendations on page 21);
   - *Advise other agencies and Crown Corporations* on all matters pertaining to energy, capacity and related GHG savings, including but not limited to integrated resource planning and lead-by-example opportunities.
   - *Take other actions* as necessary to maximize energy, capacity and related GHG savings as well as, where relevant.
4. **Provide MESA/EM with the resources, independence and authority needed to carry out its expanded role.** The current Efficiency Manitoba annual budget of $76 million must be increased substantially to enable more aggressive programs, expansion into capacity-focused savings as well as savings of transportation-related fuels, development and enforcement of new codes and regulations, and advice to agencies and crowns across government.

23 Rates are, of course, the purview of Manitoba Hydro, and the province has yet to implement the Advanced Metering Infrastructure (AMI) required to enable time-varying rates.

24 Including buildings, industry and transportation. Insofar as electrification supports overall energy and/or GHG savings, it should also be considered a part of MESA's mandate.

Recommendations: Manitoba Hydro

5. **Maintain Hydro as the Crown-owned monopoly** provider of electricity to the province, with responsibility over system planning and operations; investment in transmission, distribution, large hydropower, and grid modernization (including AMI); procuring clean power; and supporting distributed energy resources.
6. **Modernize Hydro's enabling legislation to add net zero emission** goals to the utility's mandate and objectives – specifically to maintain its current near-net zero emissions profile and to provide sufficient power to enable the province's evolution toward a carbon-competitive, net zero emissions economy – in addition to current reliability and financial sustainability goals.
7. **Ensure Hydro's Board** is empowered to provide top-quality governance by ensuring sufficient resources in line with those of boards of directors of similar organizations.

Recommendations: Manitoba Public Utilities Board

8. **Modernize the PUB's mandate** in line with the recommendation for Manitoba Hydro: add net zero emission goals to the PUB's mandate – specifically to maintain Manitoba's current power system near-net zero emissions profile and to provide sufficient power to enable the province's evolution toward a carbon-competitive, net zero emissions economy – in addition to current reliability and financial sustainability goals. This can be a complement to the other modernization efforts built into Bill 36.
9. **Direct the PUB** to account for the societal value of economic development opportunities arising from Manitoba's position as a zero-emission, low-cost electricity provider, in considering new investment proposals, and to similarly take a holistic view of affordability in cases where interactions between multiple fuels, regulated and/or unregulated, are involved.
10. **Provide PUB with sufficient authority and resources** to properly govern a complex, rapidly evolving sector, including the ability to employ or procure sufficient expertise to manage the increasing volume of activity required to support growth, and to reduce the risk of undue delays to clean power project approvals.

Recommendations: Indigenous Engagement

11. **Implement a meaningful, ongoing engagement process with Indigenous peoples.** As part of an ongoing and meaningful engagement process, Manitoba should enhance its efforts to engage in meaningful consultation with Indigenous communities, notably regarding opportunities to mitigate the negative impacts of past projects, as well as opportunities to mitigate negative impacts and enhance benefits from future developments.[25] Regarding the former, the Province and Hydro, in collaboration with affected communities, should examine opportunities to bring operational changes, including changes to current hydro operations and water licencing agreements, to address community concerns.
12. **Provide capacity-building support to enable meaningful Indigenous participation.** Both the "Save" and "Grow" components of this roadmap present significant opportunity for meaningful participation by Indigenous communities and organizations. To enable that participation, the Province and Hydro should consult to understand their energy goals and priorities, and provide capacity-building support to facilitate meaningful, informed participation. This should take the form of a dedicated facility, either through an existing organization or a new entity. [26] Indigenous leadership should be consulted on that choice.

25 In August 2022 Dunsky retained Indigenous Strategy Group (ISG) to undertake targeted engagement with Indigenous leaders and communities in Manitoba on energy policy issues. The subsequent draft report synthesized this feedback and identified several priorities for engagement: affordability, opportunities for economic participation in clean energy projects, the need for a broader sustainability lens, and respect for traditional ways of living. The report includes 12 specific recommendations for establishing meaningful, long-term engagement with Indigenous peoples on energy issues.

26 Existing entities with expertise in this area include the First Nations Major Project Coalition and Indigenous Clean Energy.

PILLAR 2: SAVE Energy and Reduce System Capacity Needs

Using electricity more efficiently – with a focus on saving both energy and capacity (see *What do we mean by "efficiency"?* inset box) – is a key component of Manitoba's electricity roadmap. Without it, there is simply no realistic way to grow the supply infrastructure fast enough and in a way that is affordable for Manitobans.

Indeed, efficiency is a proven, low-cost resource option that can bring multiple benefits:

- **Reduce or defer capital investments** required across Hydro's generation, transmission and distribution systems.
- **Provide customer benefits**, including bill savings, improved comfort, improved business productivity and competitiveness, and greater customer choice and control.
- **Free up power** for high-value uses, including economic development (new industry) and/or consumer needs (replacing imported fuels with clean, domestic electricity).
- **Avoid emissions** by replacing fossil fuel use and/or lessening the pressure to build new power plants.

Energy efficiency investments create value for all Manitobans: every $1 currently invested in efficiency programs returns over $3 in benefits.[27] With electricity demand increasing – driven by both industrials in search of competitive, emissions-free power, and by global trends toward electric vehicles and heat pumps – the value of electricity savings becomes even greater. This means that Manitoba must focus its efforts on maximizing those savings through all the tools at its disposal.

Manitoba holds enormous, untapped efficiency potential. A study undertaken by Dunsky for Efficiency Manitoba identified nearly 2,000 MW of economically achievable peak demand savings and more than 6,000 GWh of electric savings over the next 15 years – more than five times the expected results of the agency's 2023 plan.28 With much higher demand growth forecasts now than when that study was conducted, we expect an updated analysis would identify even greater savings potential.

Yet as we noted previously, **Efficiency Manitoba, alone and in its current form, does not have all the tools needed to secure these savings opportunities for the province.**

Instead, a Whole-of-Government approach – involving enhanced powers and capabilities for the primary agency, to be renamed the **Manitoba Energy Savings Authority** – as well as new means and commitments from both government and Hydro – is needed to deliver critical energy and demand savings and enable the freed electricity to be put to higher-value use.

27 http://www.pubmanitoba.ca/v1/proceedings-decisions/appl-current/pubs/2020-em-3-yr-plan/em-report-final-feb-2020.pdf
28 Dunsky, Efficiency Manitoba DSM Market Potential Study, August 2022

What Do We Mean By "Efficiency"?

Herein, we use the term "efficiency" broadly to refer to what are more technically known as **demand-side energy resources (DERs)**, i.e. all the tools that can help reduce the need for delivered energy and/or shift usage to lower-cost, off-peak periods. For example:

- **Traditional conservation** and **energy efficiency** measures, like improving insulation and weatherstripping; efficient lighting, windows and appliances; or behavioural changes like turning down the thermostat.
- **Demand response (DR)** measures that encourage customers to shift electricity demand to off-peak times, through pricing, financial rewards and other tools. For example, in New Brunswick, Saint John Energy is working with its customers to install 1,500 smart water heater controllers and tanks. The controllers allow the utility to communicate with the water heater and temporarily optimize its usage and efficiency during peak times, reducing demand and stress on the electricity grid, and lowering costs for all customers. Ontario recently introduced a new "peak perks" program to reward customers who voluntarily allow their utility to make slight adjustments to their smart thermostat settings during select peak demand events. In Quebec, the Hilo program similarly rewards customers for shifting usage – e.g. washing clothes overnight instead of at dinner time – away from costly peak periods.
- **Distributed storage**, like batteries (often combined with rooftop solar), can provide customers with more control and resiliency, while reducing both energy and peak demands on the grid. While these are not prevalent in Manitoba today, we can expect to see them grow in the coming decade, as battery costs continue their steep decline and enable homes to extend the value of their solar panels into peak evening hours, even in winter. Similarly, as electric vehicles – large batteries on wheels – become more prevalent, their "V2G" (vehicle-to-grid) or "V2H" (home) capabilities will be able to offer significant value to Hydro's grid, assuming customers are provided the right incentives and choose to enable them.[29]
- **Other measures** include **thermal energy storage** systems, **interruptible rates** for industrial users, **dual fuel** systems (heat pumps combined with gas backup during the coldest periods), and others.
- Finally, **electrification** can contribute to overall energy savings. For example, some heat pumps are two to three times more efficient than either electric baseboard or gas heating in Manitoba. Similarly, electric vehicles use about three times less energy as gas cars and trucks for the same distance travelled. While these may increase electricity use, their benefits to consumers, to the economy and to the climate can be overwhelmingly positive and are increasingly a focus of efficiency/DER efforts.

DERs can be aggregated into what are known as **virtual power plants (VPPs)** that allow electricity to be generated, stored and discharged to balance the grid and improve reliability. DERs have significant potential to meet grid capacity needs. A US study found that VPPs could deliver the same capacity benefits as a gas peaker plant, at a fraction of the cost and emissions. A recent Dunsky study for Ontario's Independent Electricity System Operator (IESO) identified 10,000 MW of potential DER capacity, with the ability to reduce peak demand by up to 40% in winter and 61% in summer.[30]

29 Many automakers are now building V2G/H capabilities into their electric vehicles (e.g. Nissan's Leaf, Ford's F150 Lightning). California is set to require it in all new vehicles beginning in model year 2030.

30 Potential demand savings are subject to real-world constraints and barriers.

Diagnostic: The Opportunity and Pitfalls of Manitoba's Growing Electricity Needs

As noted under Governance on page 12, going forward Manitoba should take a Whole-of-Government approach to energy savings, centered around a dedicated entity: the Manitoba Energy Savings Authority. See recommendations 3 and 4.

Yet beyond the structural change, select initiatives should be prioritized; planning for them should begin prior to any legislative changes. These include in particular:

Industry

Industrial demands are growing in Manitoba, in large part thanks to a growing appetite for clean power (see "Manitoba's Challenge" section). This trend offers Manitoba new economic development opportunities – and associated jobs – to support the province's prosperity.

On the other hand, new industrial loads place additional pressure on demands for electricity, although this can be at least partially addressed through stringent performance conditions.

Heating

In Manitoba's cold climate, heating presents a particular challenge: on the one hand, heating with gas and propane is a significant contributor to greenhouse gas emissions, in addition to being an economic drain as most spending leaves the province to pay for an entirely imported fuel.

On the other hand, the use of electric heat to replace gas can add substantially to Hydro's peak demand challenges, increasing cost of service for everyone.

As noted in our Draft Phase 1 Framework report, heating in Manitoba can best be addressed through three options: **improved energy efficiency, geothermal heating, and dual fuel systems**.

Transportation

Similarly, the switch from oil to electricity for most (not all) transportation needs in Manitoba – an inevitable shift given technology, policy, and industry momentum worldwide – offers tremendous environmental and economic benefits to the province, including reduced emissions, lower and more stable costs, large balance of trade improvements and improved customer experience.

On the other hand, associated electricity use can similarly add to Hydro's peak demand, though opportunities for avoiding that are much greater: by ensuring the proper **charging technology**, EVs can easily be made to charge overnight, when other demands are far lower.

Findings: Opportunities to SAVE across all sectors

Manitoba cannot afford a facile approach to energy performance: the opportunities and challenges are simply too great. Yet smart solutions are available for each of the sectors addressed previously:

Industry

As industrial activity grows alongside the clean energy transition, demand for the province's low-cost, low-carbon electricity is expected to continue to grow. As discussed previously (see Governance section), Manitoba is increasingly in a position to demand world-class energy performance, including both (a) best-in-class energy efficient technology, including heat recovery where relevant, and (b) load flexibility to facilitate Manitoba Hydro's management of the province's peak demands.

Heating

Manitoba can lean into a variety of solutions to save energy and reduce peak demand from heating, all the while reducing emissions. Among these, the following are particularly well-suited to Manitoba's uniquely cold climate:

- **Efficiency**, the first choice, is well understood: homes and buildings with better-insulation and weatherized envelopes simply require less energy while improving comfort.

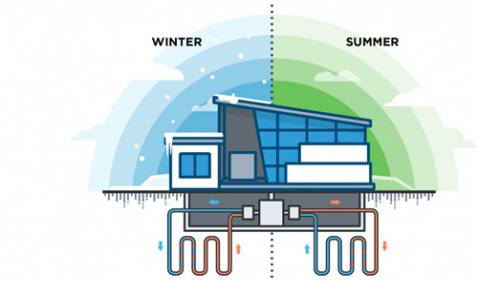
  Yet building regulations have long allowed for too much energy leakage and waste. Going forward, more stringent regulations – including building codes (for new construction or major renovations) and performance standards (for existing buildings) – are essential to stop the "bleeding" and save valuable electric energy and capacity.

- **Geothermal** is among Manitoba's most high-value yet underused opportunities to save energy (see box).

  Past efforts have produced limited success, in part because the industry itself is disparate and in part because efforts have been limited in scope. Far greater consumer adoption is possible, but only with a concerted, push-pull strategy to overcome current market barriers and ensure quality projects. New business models for promoting, delivering and maintaining geothermal systems may be key.

- **Dual fuel** heating systems – that combine air-source heat pumps for most heating needs with natural gas for the coldest days of the year – is gaining ground in cold climates across North America.

  While not as efficient or environmentally friendly as geothermal, emissions reductions can still be significant, while avoiding costly peak impacts for the electricity grid. With Hydro owning both the power and gas networks, dual fuel systems – which include controllers that can automatically switch heating systems based on outdoor temperature or other factors – could play a valuable role.



Geothermal, otherwise known as ground-source heat pumps, is the ideal heating source for Manitoba's cold winters.

Hyper-efficient, geothermal typically provides building occupants with a 4:1 return: by leveraging heat stored near the surface of the ground, consumers can save up to 75% on their heating costs relative to electric furnaces or baseboard heaters.

Because of the constant below-ground temperature, geothermal is also less reliant on back-up electric resistance heating, dramatically reducing peak demands on the electrical system. It further provides extremely efficient cooling during increasingly hot summer months.

Other solutions – including thermal energy storage and even distributed batteries – can also play a role, though widespread market adoption in the near-term is less likely.

Transportation

As noted earlier, the combination of sweeping regulations and dramatic improvements in technology and cost are ushering in an era of vehicle electrification. While the advent of EVs will provide many benefits for Manitoba, their electricity use could put additional pressure on Hydro's system.

One critical way to reduce the peak demands of EVs is through smart charging: since the vast majority of EVs will charge at home, and most vehicles sit idle from roughly 6pm to 7am, Hydro can avoid significant evening peak impacts if charging takes place after 10pm, when peak demand drops.

Smart chargers can easily automate that shift. And governments can easily require smart EV chargers, as the U.K. did in 2022. With those in place, Hydro or MESA can offer customers incentives to enable the units' load-shifting capabilities, thus moving most charging out of the utility's high-cost, peak periods.[31]

Below we outline the key roles that each agency should play in this whole-of-government approach.

Recommendations: Government of Manitoba

Achieving maximum energy and capacity savings in Manitoba is critical to enabling the province to achieve its goals, effectively and affordably. Enabling MESA and other agencies to deliver on this promise will require that government prioritize energy and capacity savings to an even greater extent than previously. Specifically, we urge the Government of Manitoba to:

13. **MESA Legislation and Funding**: Government will need to work expeditiously to empower and ensure funding for the new Manitoba Energy Savings Authority and its expanded responsibilities.
14. **Signal support for expanded Codes & Standards:** We have recommended that MESA be designated the authority to define new codes and standards as they pertain to the energy component of buildings. Doing so may require legislative change. In the interim, however, government should signal strong support for more stringent regulatory rules as they pertain to building performance, to slash waste and reduce Hydro's cost of meeting peak needs.

    In particular, government can signal interest in developing energy benchmarking, disclosure and performance standards for existing buildings, a flexible approach that supports energy efficiency without prescribing specific measures. Disclosure and performance standards can raise the bar and provide more transparency and predictability to the real estate market. Government should also revisit the recently adopted energy code update for buildings.[32] Manitoba should move quickly to take advantage of the $100 million the federal government has made available to provinces and agencies to support the adoption of high-performance energy codes, under its Codes Acceleration Fund.[33]
15. **Lead by example**. Manitoba should set a target for all buildings to be net zero by 2050. Sub-monitoring of all government-owned facilities should be implemented as a first step to enable performance measurement and improvement. An evaluation of the building stock can help determine the optimal timing and sequencing of upgrades for existing buildings. Leading by example sends an important signal to other building owners and demonstrate the feasibility of energy efficiency and GHG savings measures. This target is consistent with Manitoba's Low-Carbon Government Office's action plan goals to establish "interim targets, drive reduction in GHG and explore carbon sequestration and offsets" and "advance efforts for carbon neutrality."[34]

Recommendations: The Manitoba Energy Savings Authority (MESA)

16. **Support the Economic Development Board and the Electricity Task Force** by advising on energy performance conditions for new industrial loads.
17. **Develop a province-wide Clean and Efficient Heating Strategy.** The strategy should go far beyond

31 Furthermore, once Manitoba adopts smart meters (see recommendation re. "AMI" infrastructure), time-of-use rates (e.g. Ontario's new "Ultra-Low Overnight" rate) can further encourage off-peak charging.

32 The province recently proposed to adopt the lowest Tier of energy performance requirements available under the new model national building code.

33 The federal government has made $100 million available to provinces and agencies to support the adoption of high-performance energy codes, under its Codes Acceleration Fund https://natural-resources.canada.ca/energy-efficiency/buildings/codes-acceleration-fund/24794

34 Manitoba Conservation and Climate. 2020. Low-Carbon Government Annual Report.

voluntary incentives, to include all the tools in the toolbox including encouraging new business models, optional rates (in collaboration with Hydro), quality assurance and regulatory tools. It should further offer choice to consumers, including geothermal, dual fuel, enhanced efficiency and others.

18. **Develop regulations for smart EV chargers** to greatly reduce peak needs while enabling EV adoption in Manitoba.
19. **Expand existing industrial and agricultural efficiency programs and R&D.** Industrial energy use represents nearly one-quarter of Manitoba's energy demand. This is expected to grow as domestic industries electrify, and new industries site their operations in the province. EM's existing industrial efficiency programs should be expanded to support adoption of best-in-class technologies and research and development of emerging technologies (e.g., through EM's Innovation Fund). Additional support should also be provided for enabling programs, including workforce development and training programs, strategies to enhance program equity, quality assurance and related initiatives.

Recommendations: Manitoba Hydro

Manitoba Hydro has an important role to play in encouraging energy and capacity savings, especially insofar as they can defer current or future capital investments. In particular, Hydro should prioritize two significant actions:

20. **Implement Advanced Metering Infrastructure and other cost-effective smart grid technologies.** Across Canada, about three quarters of all households are now served by modern, Advanced Metering Infrastructure (AMI), a number that is expected to reach 94% in four years.[35] [36] As one of the last provinces still to implement AMI, Manitoba is at risk of not having access to a host of tools to effectively reduce and shift electricity demand.

    AMI would enable Hydro to implement more flexible rate structures – increasingly common across North America – that provide customers with more ability to manage daily or seasonal peaks and be rewarded accordingly. Such metering infrastructure enables other benefits, including providing critical information for MESA/EM to better design energy saving programs, while reducing the significant labour costs associated with manual meter reading.

    Manitoba Hydro should act quickly to implement AMI and other cost-effective grid modernization tools.[37] By modernizing the infrastructure that links it to its customers, it can unleash an array of tools to reduce and shift needed electricity demand, freeing up capacity for high-value uses and/or deferring capital costs, in addition to cost savings from manual meter reading.

21. **Collaborate with MESA on a DER and Rate Modernization Strategy**. So-called "demand-side energy resources" (DERs) involve an array of tools, including those that fall squarely in MESA/Efficiency Manitoba's purview, but also some that are best delivered by or in collaboration with Manitoba Hydro. For example, once smart meters are installed, Hydro can begin offering time-varying rate options to customers. Similarly, measures known as "direct load control", in which consumers voluntarily allow their utility to make small adjustments to when and how select energy-using equipment operates (or make adjustments themselves when signalled), often in exchange for rewards or other benefits, will require Hydro's involvement, while promotion and delivery can be shared with MESA/EM.

    Given the array of options and of types of market strategies, including time-varying rates, Hydro should provide its expertise in collaboration with MESA/EM, under the latter's purview, on a broad DER strategy for the province.

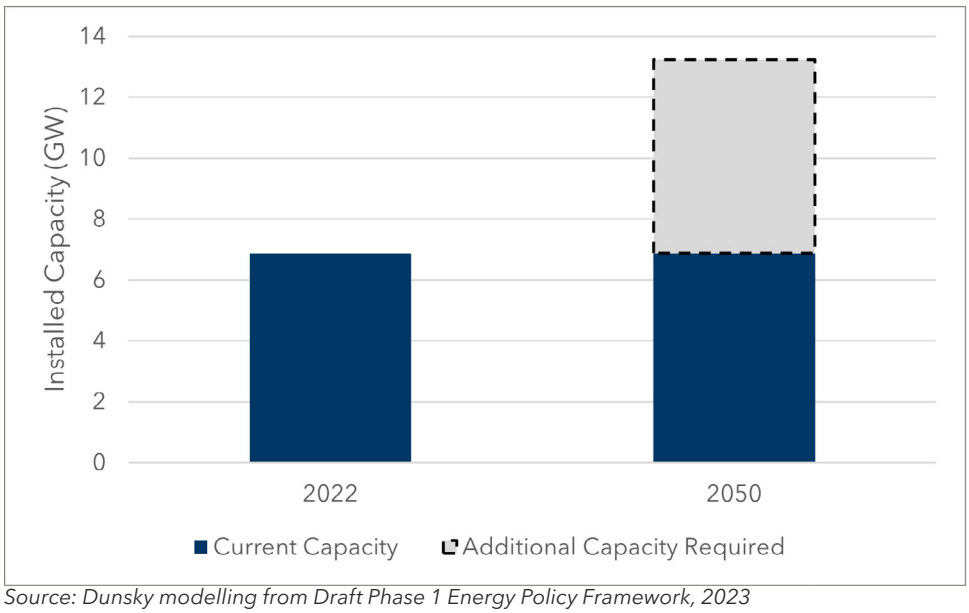
35 Berg Insight AB, *Smart Metering in North America* – 5th Edition, December 2022.
36 Saskatchewan recently became the latest province to announce its intent to build AMI province-wide.
37 These include grid automation, controls, and communications technologies such as Advanced Distribution Management Systems (ADMS), and Distributed Energy Resources Management Systems (DERMS).

PILLAR 3: GROW the Supply of Clean Electricity

As we saw earlier, to meet growing electricity demand from economic development and electrification of end use sectors, Manitoba will need to add significant new generating capacity over the coming decades.

Diagnostic: Electricity Needs will Double, Even With More Savings

Figure 8. Manitoba's installed capacity will likely need to double by 2050 to meet growing electricity demand



Source: Dunsky modelling from Draft Phase 1 Energy Policy Framework, 2023

As Figure 8 shows, Manitoba will need to substantially grow its electricity system by 2050 to meet future demand from industrial growth and electrification of other sectors. Analysis conducted for Dunsky as part of our draft Phase 1 Framework shows that 6.4 GW of additional capacity (including generation and energy storage) may be required, on top of the current installed capacity of roughly 6.9 GW.[38]

To meet this demand, Manitoba will need to increase capacity from non-emitting sources (including wind, hydro, biomass and others); invest in energy storage or other power flexibility solutions to manage variable sources of generation; and invest in transmission and distribution systems to meet increases in demand and supply.

The rate at which new supply will be added depends on how quickly demand materializes. In Dunsky's 2050 scenario, capacity grows at around 1.4% per year to 2030, then by 2.4% from 2030-2040 and 5.1% from 2040-2050.[39] This pace of build out will be challenging to meet, and will require a) alleviating barriers (e.g., permitting, siting, and interconnection), and b) accelerating non-traditional resources (like DERs) that are both quick to deploy and scalable. A whole-of-government approach to maximize efficiency and savings, including DERs (see Pillar 2), will prove essential to mitigating some of the buildout challenges and costs.

38 This number includes the 695-MW Keeyask Generating Station which came online in 2022.
39 In its draft IRP, Manitoba Hydro forecasts faster demand growth, leading to a need for new capacity and energy resources in the mid-2020s.

Findings: Take a Portfolio Approach to Adding Supply

Faced with this challenge, Manitoba can turn to a broader array of clean power solutions than was available in the past. These include:40

- **tried-and-true renewables** like hydropower[41], wind power and solar PV[42] [43];
- **flexible loads** and certain other DERs discussed in the previous section (see p. 17);
- **emerging technologies** such as long-duration storage technologies, small modular reactors, gas with carbon capture and storage (CCS), and hydrogen peaker plants;[44]
- **T&D grid enhancements** and expansions, to deliver power to end-users and/or optimize with neighbouring regions.

No option can be looked at in isolation; like pieces of a large puzzle, each provides different, often-complementary services – and involves different tradeoffs – to the whole.

Modelling presented in Dunsky's draft Phase 1 Framework report found that, in addition to DERs discussed previously, a combination of significant new windpower and storage is likely to play the largest role in a least-cost, carbon-constrained growth pathway for Manitoba. Meanwhile, Manitoba Hydro's draft IRP results suggest different pathways, involving windpower but also unabated natural gas. The difference likely arises from different model constraints and assumptions.

In choosing among options, Manitoba will need to weigh multiple factors, including cost (anticipated cost, construction risk, federal subsidies), risk (technology performance risk, social acceptability), and value (to system reliability, to Indigenous communities).

Manitoba will also want to consider financial implications for Hydro, given its heavy debt load and financial challenges, both for itself and the province. [45] Equally important will be engagement with Indigenous communities, both to ease the path to growth and to seize the opportunity for economic reconciliation.

We note too that significant federal funding is now available for new clean supply, storage and transmission. A recent study found that **Manitoba could access over $2 billion in federal funding for that purpose.**[46]

Manitoba should seek to take advantage of this opportunity and pursue a portfolio of supply-side options that meets its needs, while maximizing federal incentives and adhering to pending regulatory requirements for power plant emissions.

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40 Note that this list does not include "unabated gas" plants, i.e. gas power plants without CCS. While technically possible, we recommend considering investment in such plants as a last resort, notably given Manitoba's current position as a clean, emissions-free source of power.

41 Notably capacity upgrades to existing hydropower facilities and/or pumped storage projects.

42 In Manitoba, to provide value to the grid, solar PV would need to be coupled with battery storage in order to extend availability into peak evening hours.

43 While less prevalent in Manitoba, wind and solar power have grown exponentially in the past two decades. By 2022, installed capacity of wind power had grown to nearly 900,000 MW worldwide (including 163,000 MW in North America). Installed capacity of solar PV *exceeded 1 million MWs* (including 127,000 MW in North America). While both have a role to play in Manitoba, windpower is currently far more advantageous given the province's resources and loads.

44 These are in various stages of experimentation and, with rare exception (pumped hydro), have not yet demonstrated success at a commercial scale. Emerging technologies should be approached with great diligence, given the inherent risks and costs involved, especially as compared to other options.

45 Manitoba Hydro's debt now stands at $24 billion; financing costs account for 40 cents on every dollar consumers pay.

46 https://climateinstitute.ca/wp-content/uploads/2023/06/Clean-Electricity-Affordable-Energy.pdf

Federal Funding Opportunities for Clean Electricity

The federal government announced a suite of electricity-related incentives and subsidies in its March 2023 budget. According to one analysis, these measures make Canada the second most attractive clean energy investment destination, after the US.

Analysis by the Canadian Climate Institute estimates that **Manitoba could qualify for over $2 billion in federal support** under three programs announced in Budget 2023:

- **The Clean Electricity and Clean Technology Investment Tax Credits** (ITCs) provide tax incentives for most clean electricity projects. Specifically:
  - The 30% Clean Technology ITC is open to taxable entities (including independent power producers who could supply power to Hydro), for wind, solar, hydro, nuclear and storage projects;
  - The 15% Clean Electricity ITC is open to non-taxable entities, including Crown corporations such as Manitoba Hydro as well as Indigenous organizations, for the same projects in addition to interprovincial transmission and abated natural gas plants. Eligibility requires a commitment that the electricity grid achieve "net zero" emissions by 2035.
- **The Smart Renewables and Electrification Pathways program** (SREP) received an additional $3 billion to support critical regional priorities, including transmission and grid modernization.
- **The Canada Infrastructure Bank** (CIB) received a renewed mandate to support clean electricity and electrification, with at least $20 billion in low-cost financing for major clean electricity infrastructure projects, including a focus on Indigenous equity partnerships.

Principles and Priorities for Growing Supply

Notwithstanding differences in modelling results, we suggest the province adopt five principles going forward:

1. **Enable greater IPP/Indigenous participation**. Manitoba Hydro's debt situation, while problematic, is not alarming to the point of requiring extreme measures. Yet with anticipated growth in power needs, now is the time to ensure that Hydro's own capital investments focus on areas of core expertise, notably the power grid itself and large hydropower (including potential hydro expansions and/or pumped hydro).

   Meanwhile, Hydro can and should rely more on third-party developers for power options where others bring expertise and added value: new renewables, battery storage[47], gas plants (if used) and small modular reactors (SMRs). As a general rule, Manitoba should follow standard North American practice for non-competitive markets – much as its counterparts like SaskPower, Hydro-Quebec and BC Hydro now do (see textbox on page 26) – and procure these from third-party developers under long-term power purchase agreements. The opportunity to encourage Indigenous participation, including equity, should in particular be encouraged.
2. **Invest in underlying infrastructure**. There is little doubt that a doubling (or more) of power needs will require significant growth in underlying infrastructure, including transmission, distribution and, as previously discussed, metering infrastructure. With federal incentives available to Manitoba Hydro, and the risk of inflationary pressures from similar needs worldwide over the coming decades, we encourage near-term investment in these areas.

47 Note that an argument could be made either way for storage projects.

3. **Prioritize non-emitting generation in the near-term**. Hydro should do everything in its power to maintain its clean power advantage. Doing so allows Manitoba to maximize its eligibility for federal funding, maintain its near-zero-carbon advantage for investment attraction, and avoid locking in solutions, notably natural gas power plants, for which great policy (and, in the case of CCS, technological) uncertainty remain.
4. **Move fast on "safe bets"**. Some options can be pursued with relative certainty regarding cost and performance: in addition to grid modernization and expansion investments discussed above, wind and storage can add significant value to the grid, while also being developed by IPPs and Indigenous partners. To the extent they are procured competitively, most or all of the 30% federal tax incentives can be expected to flow to ratepayers. Manitoba should prioritize the pursuit of these options in the near-term, alongside grid expansion and modernization, while continuing to explore options with greater uncertainty that may either prove necessary or achieve lower risk profiles in the future.
5. **Emphasis on risk mitigation and optionality for "riskier bets"**. As we noted earlier, there are many new, non-emitting options with which to grow supplies, yet some carry far greater technological, construction, social and performance risk than others.[48] In an era of rapid change, we urge great importance be given to risk mitigation. This can be done by (a) explicitly considering risk and valuing optionality in power planning, as well as moving quickly on lower-risk options, and/or (b) ensuring that proponents other than Hydro accept full risk for those options with greater uncertainty.[49]

Recommendations: Meeting near- and long-term needs

Given the principles and priorities numerated above, the Government of Manitoba and Manitoba Hydro should take the following actions to ensure a sufficient supply of electricity to meet the province's needs over the next 10-15 years while protecting customer rates and minimizing additional debt burden:

22. **Maintain/reconfirm Hydro's central role as the province's public utility and monopoly provider**, with responsibility over electricity system planning and operations; investment in transmission and distribution (T&D), hydro resources, and grid modernization; and procurement of additional energy and capacity resources as needed to enable long-term emissions reductions and strategic economic development opportunities.
23. **Focus investment planning on expanding core Hydro assets,** including grid infrastructure, metering (AMI; see earlier recommendation) as well as, if and where practical, existing hydroelectric assets.[50] In particular, Hydro should immediately begin to plan T&D infrastructure growth for three purposes: (a) electrification of existing loads, in particular assessing distribution grid needs for vehicle charging, (b) new industrial loads, and (c) potential opportunities to optimize power exchanges with neighbouring states and provinces.
24. **Begin planning for competitive procurements to acquire non-emitting power** to meet the province's growing energy and capacity needs. As provinces like BC, Alberta, Saskatchewan, Ontario, Quebec and Nova Scotia double down on growing clean power like wind and storage, Manitoba should quickly signal its

48 For example, small modular nuclear reactors (SMRs) currently offer promise for providing flexible generation in the future, but performance and cost savings remain to be demonstrated at scale. Similarly, though good progress is being made, CCS cost and performance remains uncertain. By explicitly accounting for risk, Manitoba can effectively build valuable optionality into its planning.

49 For example, risk related to future emissions legislation and/or fuel price fluctuations should accrue to IPPs for gas plants; similarly, the cost or performance risk of SMRs, CCS or hydrogen peakers can be made to accrue to their proponents. The same should apply to wind, solar and battery storage plants, although experience suggests their cost and operational risk profiles are far lower.

50 Some existing hydro assets may present optimization opportunities, including capacity expansion and/or conversion to pumped hydro. Dunsky has not undertaken an assessment of these opportunities as part of our work.

Independent power projects in Saskatchewan, British Columbia and Quebec

Crown utilities in other Canadian provinces have turned to independent power producers (IPPs) to build new clean supply, while maintaining their central roles of electricity system planning and operations.

SaskPower procures about a quarter of its electricity from IPP-owned wind, solar, biomass and natural gas projects. The utility has also partnered with an IPP to build a grid-scale battery storage system. In 2022 Saskatchewan added 375 MW of wind from two large IPP-owned facilities (Golden South and Blue Hill). SaskPower has also signed power purchase agreements with Indigenous communities; e.g., the Cowessess First Nation has supplied renewable energy since 2013, and recently announced the 200-MW Bekevar wind project with support from the federal government and Canada Infrastructure Bank.[1] SaskPower's IPP projects also provide benefits for farmers and rural communities, providing steady income and financial insurance in the case of a bad crop, and providing employment for local trades and contractors.

BC Hydro procures more than 21,000 GWh a year from IPPs, mostly hydro, wind and biomass. It uses competitive procurement to add supply while keeping costs low and minimizing market risks for ratepayers. BC Hydro intends to launch a call for power in 2024 to procure 3,000 GWh per year of clean or renewable electricity to meet the province's growing needs. BC Hydro also plans to expand existing hydro facilities and ramp up its energy efficiency programs to meet future demand.

Hydro Quebec generates most of the province's electricity from its hydro facilities. It also procures power from IPPs, which operate small hydro, biomass and wind facilities. These include the 200 MW Apuiat wind project (a joint project between the Innu communities and Boralex), and the 224 MW Nicolas-Riou wind project (developed by EDF Renewables).

1 https://www.canada.ca/en/natural-resources-canada/news/2023/06/government-of-canada-supports-clean-renewable-energy-with-50-million-investment-for-indigenous-led-wind-power-in-saskatchewan.html

intent, alongside multiannual committed plans, to launch procurement for new resources. This will provide both the confidence to attract private sector interest and investment, and the time for the sector to engage with Indigenous and other communities, form beneficial partnerships and identify the most advantageous sites for Manitoba.

25. **Prioritize DERs to maximize load flexibility**, including currently-available DER resources in Hydro's full or shared purview (see discussion on DERs on Pillar 2, page 17), and the assessment of, planning for and enablement of DER resources that AMI investments will unlock. We note that while AMI will take time to plan, procure and roll out, work should begin immediately on assessing – and subsequently building into both resource and AMI investment planning – the full flexibility potential that optional functionalities can unleash.
26. **Continue to explore the range of flexible supply options**. Hydro will need to maintain reliability and balance its evolving portfolio of renewable power with the needs of growing loads. Gas plants are arguably the simplest short-term option, but with the performance (and costs) of carbon capture and storage still uncertain, emissions could rise just as the value of Hydro's emissions-free power (and brand) is materializing. This could negatively impact provincial economic development opportunities. We strongly encourage Hydro to continue exploring alternative flexibility options (and to maximize use of load flexibility in the interim (see recommendation above) to keep its options open while alternatives – including a variety of new long-duration storage technologies, in addition to SMRs and hydrogen peaker plants – continue to develop. Hydro should further explore the opportunity of pilot projects for these solutions – including potentially a

pilot SMR.[51]

27. **Provide regulatory flexibility to facilitate the pace of growth**. While the PUB no longer reviews large capital expenditures, its rate-setting process nonetheless requires a classic prudency determination. Given the need for timely investment to accommodate anticipated historic demand growth, we encourage the PUB to consider mechanisms – such as principles related to anticipatory investments and/or extended amortization to more closely match the timing of ratepayer costs to benefits. To the extent such mechanisms require regulatory or legislative change, these should be brought forward to government for consideration.

Recommendations: Indigenous Participation

As noted previously, early involvement of Indigenous communities is critical to success from two perspectives: equity (ensuring that Indigenous communities benefit materially from new electricity development on their traditional lands), and efficiency (enabling the pace of growth needed).

In addition to previous recommendations (see Recommendation 11 and 12):

28. **Reduce reliance on diesel and unlock community renewable energy projects though an Indigenous power purchase program.** Manitoba should work with Indigenous and northern communities and the federal government to assess fossil fuel reduction pathways for remote communities. Options could include energy efficiency, fuel switching, renewable power and storage, in addition to connection to the main grid. Some communities may also be interested in establishing community utilities to manage their own electric distribution system, although this could require substantial cost and capacity building.
29. **Incentivize partnership with Indigenous organizations in clean power projects**. In addition to Indigenous community-based projects, the development and operation of new clean power projects by IPPs and Hydro provides an opportunity for Indigenous communities and organizations to participate as partners, through equity participation, revenue sharing or other structures. Competitive procurement processes for clean energy projects should include mechanisms to strongly encourage Indigenous participation. We note that Indigenous participation, while providing direct financial benefits to the community, can also create other benefits including job creation and critical capacity-building with long-term value.

51 Manitoba has a history of nuclear research at the Whiteshell Laboratories, and there may be an opportunity to accelerate permitting for a future SMR on that site.

Conclusion

The energy transition creates unprecedented opportunity for Manitoba to build on its clean electricity leadership and position itself to attract the growing industries of the future, while maintaining consumer affordability, driving growth and productivity, and slashing emissions.

To seize these opportunities, Manitoba must take bold and coordinated action across multiple fronts:

1. **GROW** the supply of clean, non-emitting electricity
2. **SAVE** energy and reduce system capacity needs
3. Modernize **GOVERNANCE** by aligning agency mandates and regulatory frameworks with these objectives

This document provides a roadmap[52] and a series of actions to make this vision a reality – see the Appendix for a full list, including key roles and responsibilities.[53] If executed well, these changes will reap long-lasting economic, social and environmental benefits to Manitobans for a generation to come.

52 As indicated previously, this is an Electricity Roadmap; as such, it does not aim at the broader energy landscape that was the target of Phase 1.

53 Purposefully, this leaves a number of implementation details to be determined.. For example, we outline broad responsibilities for the expanded Manitoba Energy Savings Authority (currently Efficiency Manitoba), but leave open the question of who the new agency reports to, what specific legislative changes are required, and whether to extend its scope to GHG emissions reductions beyond those related to energy savings.

Appendix: Summary of Recommendations

Actions	Key Actors[54]			
	Prov	MH	EM	PUB
Pillar 1: Modernize GOVERNANCE				
1. Form a permanent, decision-level Electricity Task Force.	✓	✓	✓	
2. Develop and implement a framework for industrial energy use.	✓	✓	✓	
3. Designate the current Efficiency Manitoba as the province's new Manitoba Energy Savings Authority.	✓		✓	
4. Provide MESA with the resources, independence and authority needed to carry out its expanded role.	✓		✓	
5. Maintain Hydro as the Crown-owned monopoly provider of electricity to the province.	✓	✓		
6. Modernize Hydro's enabling legislation to add net zero emission goals to the utility's mandate and objectives.	✓	✓		
7. Empower and resource Hydro's Board to provide top-quality governance.	✓	✓		
8. Modernize the PUB's mandate to add net zero emission goals and expanded oversight.	✓			✓
9. Direct the PUB to account for the societal value of economic development opportunities arising from Manitoba's position as a zero-emission, low-cost electricity provider, in considering new investment proposals.	✓			✓
10. Provide PUB with sufficient authority and resources to properly govern a complex, rapidly evolving sector.	✓			✓
11. Implement a meaningful, ongoing engagement process with Indigenous peoples.	✓			
12. Provide capacity-building support to enable meaningful Indigenous participation.	✓			

54 Key actors include the provincial government (Prov), Manitoba Hydro (MH), Efficiency Manitoba (EM) and Public Utilities Board (PUB).

Actions	Key Actors[54]			
	Prov	MH	EM	PUB
Pillar 2: SAVE Energy and Reduce System Capacity Needs				
13. Work expeditiously to empower and ensure funding for the new Manitoba Energy Savings Authority and its expanded responsibilities.	✓		✓	
14. Signal strong support for more stringent regulatory rules as they pertain to building performance, including building energy codes, and benchmarking, disclosure and performance standards for existing buildings.	✓		✓	
15. Lead by example: Manitoba should set a target for government buildings to be net zero by 2050.	✓			
16. Support the Economic Development Board by advising on energy performance conditions for new industrial loads.	✓	✓	✓	
17. Develop a province-wide Clean and Efficient Heating strategy.	✓		✓	
18. Develop regulations for smart EV chargers to greatly reduce peak needs while enabling EV adoption in Manitoba.	✓	✓	✓	
19. Expand existing industrial and agricultural efficiency programs and R&D.	✓		✓	
20. Implement Advanced Metering Infrastructure (AMI) and other cost-effective smart grid technologies.		✓		✓
21. Hydro and MESA should collaborate to develop a DER and Rate Modernization Strategy.		✓	✓	
Pillar 3: GROW the Supply of Clean Electricity				
22. Maintain/reconfirm Hydro's central role as the province's public utility and monopoly provider.	✓	✓		
23. Focus investment planning on expanding core Hydro assets, including grid infrastructure, AMI, and where practical, existing hydro assets.		✓		
24. Begin planning for competitive procurements to acquire non-emitting power to meet the province's growing energy and capacity needs.	✓	✓		
25. Prioritize distributed energy resources to maximize load flexibility.		✓	✓	

Actions	Key Actors[54]			
	Prov	MH	EM	PUB
26. Continue to explore the range of grid flexibility options.		✓		
27. Provide regulatory flexibility to facilitate the pace of growth.	✓			✓
28. Reduce reliance on diesel and unlock community renewable energy projects though an Indigenous power purchase program.	✓	✓		
29. Incentivize partnerships with Indigenous organizations in clean power projects.	✓	✓		

"NO DISCLAIMERS" POLICY

This report was prepared by Dunsky Energy + Climate Advisors, an independent firm committed to quality, integrity and unbiased analysis and counsel. Our findings and recommendations are based on the best available data at the time the work was conducted as well as our experts' professional judgment.

Dunsky is proud to stand by our work.