
REPORT OF THE
**Expert Advisory
Council *to the*
Minister of
Environment,
Climate and Parks**

A Second Carbon Savings
Account for Manitoba
DECEMBER 2022

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Land Acknowledgement

The Expert Advisory Council acknowledges that Manitoba is situated within Indigenous Nations land and, as an action of reconciliation, we have made this acknowledgement at the start of our meetings. It is an important recognition and acknowledgement to have as we work to collaborate with Indigenous Nations on addressing the reduction of emissions.

We acknowledge that we gather, work and reside within the Treaty 1, 2, 3, 4, 5 Territories and that Manitoba is located on the ancestral lands of the Anishinaabeg, Anishininewuk, Dakota Oyate, Denesuline and Nehethowuk Nations.

We acknowledge Manitoba is located on the Homeland of the Red River Métis.

We acknowledge northern Manitoba includes lands that were and are the ancestral lands of the Inuit.

We respect the spirit and intent of Treaties and Treaty Making and remain committed to working in partnership with First Nations, Inuit and Métis people in the spirit of truth, reconciliation and collaboration.

Letter to Minister

Dear Minister Wharton,

This report sets out the Expert Advisory Council's (the Council) recommendations on Manitoba's second Carbon Savings Account (CSA) for the 2023-2027 period. The [first report and set of recommendations](#) were published in 2019.

In preparing these recommendations, the Council has considered a substantial amount of expert input, stakeholder feedback, economic modeling, and technical advice. We reviewed complementary government strategies and directions, as well as the approaches and feedback provided by Manitoba business, industry representatives and the not-for-profit sector. In our deliberations, we also took note of the government's commitment in the recent [Speech from the Throne](#):

"Manitoba continues to pursue further emission reductions across all sectors of the economy, and we will do our share to help Canada meet its international obligations."

With this in mind, we have considered how our recommended approach would align with federal and international emission reduction goals.

The Council respectfully presents our advice and recommendations to help government achieve its statutory commitment under [The Climate and Green Plan Act](#). It is our intention that these recommendations help position Manitoba for a sustainable and prosperous future. We recognize that all sectors, communities, Indigenous Nations and each Manitoban has an important role to play reducing greenhouse gas (GHG) emissions and have highlighted key actions and opportunities for government's consideration going forward.

We recognize that reducing emissions will require commitment to a long-term objective of net-zero GHG emissions that will require every community and each Manitoban to choose new paths forward to advance the province's necessary transition to a green economy. Globally, investors are increasingly focusing on climate resilient, green economy locations for their business investments. Not only do green economies support low carbon operations, resilient communities suffer fewer costly climate disruptions. We are confident these recommendations will support Manitoba's transition to a new low-carbon economy that builds on its energy assets and ensures its competitiveness with other jurisdictions.

We offer our ongoing support as Manitoba works to achieve the next CSA goal and continues to implement the Climate and Green Plan.

Working together towards a bright future for Manitoba.

Original signed by all Council Members

1. Executive Summary

The Expert Advisory Council (the Council) was established on June 12, 2018 by the Manitoba government to provide advice and recommendations to the Minister of Environment, Climate and Parks (ECP) on implementing the Made-in-Manitoba Climate and Green Plan. The Council is an independent group of experts (see Appendix C for Biographies of Council members). As per section 3 of the Climate and Green Plan Act, the Council is also responsible for providing advice and recommendations to the Minister of Environment, Climate and Parks on establishing Manitoba's five-year Carbon Savings Account (CSA). This report outlines the Council's recommendations on Manitoba's greenhouse gas emissions (GHG) reduction goal for the second CSA period (CSA2) which runs 2023-2027.

For the first Carbon Savings Account period from 2018 to 2022 (CSA1), the Council recommended a GHG emission reductions goal of no less than one megatonne (Mt) of CO₂e cumulative emission reductions. The latest available data provided by the federal government shows that Manitoba emission reductions are progressing in line with this goal.

The Council developed recommendations for CSA2 based on several sources including expert advice, energy-economic modeling, and from our own expert knowledge of the subject matter. The Council also reflected on important input from a diverse range of stakeholders; meeting with several, reviewing written submissions and engaging with a broader group of representatives via survey. The Council also received input from government departments on policies that could lead to GHG emission reductions.

For CSA2 the Expert Advisory Council recommends that Manitoba set an emission reductions goal of 5.6 Mt of CO₂e cumulative emissions reductions for the 2023 to 2027 period.

In addition, the EAC provides the following supplementary advice:

1. That Manitoba consider establishing an emission reductions pathway to achieve net-zero by 2050.
2. That Manitoba monitor for additional opportunities and take appropriate actions to reach an 8.0 Mt cumulative emissions reductions over the 2023 to 2027 period.
3. Any shortfall in achieving the one Mt goal from CSA1 must be added to CSA2 as part of the 'debit' feature of the CSA to ensure there is continued effort in reducing emissions.
4. That Manitoba identify and undertake foundational measures, such as updating and introducing policies and programs in CSA2, to support emissions reductions for the next Carbon Savings Account goal 2028-2032 (CSA3).
5. That Manitoba continue to engage with stakeholders throughout the CSA2 period to further encourage and advance emission reductions in all sectors. A strong focus on working with Indigenous communities and organizations must be included.

These recommendations are underpinned by modelling done by third party experts and are intended to position Manitoba to prosper as a member of the emerging low-carbon, climate-resilient economic future. To achieve the minimum 5.6 Mt reduction, there will need to be a number of measures implemented by all levels of government, including all provincial government departments.

Existing provincial actions, such as Efficiency Manitoba programs and recently announced federal policies (e.g., pricing carbon, clean fuel regulations, zero emission vehicle (ZEV) sales mandates) will encourage emission reductions. Beyond these helpful existing measures, Manitoba will need to continue to enhance and accelerate emission reductions measures in our current policies and programs, such as advancing building efficiency and fuel switching. To reach the more ambitious goal of 8Mt, the Federal Emissions Reduction Plan will have to be fully implemented in the province and augmented with Manitoba policy and programs in key areas, such as buildings, transportation and industry.

The Council recognizes that Manitoba has accomplished many of its “quick hits” in CSA1, such as the decommissioning of the Brandon 5 coal-fired Generating Unit. Other provincial actions that led to significant emissions reductions in CSA1 included the renewable fuels mandate and projects delivered by the newly-created Efficiency Manitoba. The majority of the current progress on emissions reduction stems from changes in households and businesses. To date, Manitoba has already seen shifts in energy sources for industrial processes, energy upgrades in buildings and increased uptake of ZEVs. The Council strongly recommends that Manitoba consider new and/or enhanced actions, initiatives and policies across all sectors, and notes that major sources of GHG emissions come from many small individual sources including transportation, agriculture, stationary combustion, and waste.

Examples of actions the EAC recommends that Manitoba consider and advance include:

- support electrification of buildings, industry, and transportation;
- grow clean power supply and distribution, such as through advanced efficiency measures and reduce reliance on fossil fuel use;
- support agriculture in achieving sustainable food and biofuel production while reducing GHG emissions; and
- improve waste management practices and advance circular economy efforts

The Carbon Savings Account is a unique way to drive ongoing emissions reductions for Manitoba. The Council has learned from CSA1 that cumulative emissions reductions is an effective method to target, advance and measure carbon emissions reductions in Manitoba. The progress made to date on CSA1, and recommendations in this report for CSA2, will help set the stage for CSA3 (2028–2032) and will set Manitoba on a net-zero pathway. Continued engagement with all sectors will be critical for success in each Carbon Savings Account period.

2. Introduction

Recognizing the urgency to reduce greenhouse gas (GHG) emissions, the Province of Manitoba established Canada's first ever Carbon Savings Account (CSA) under the [Climate and Green Plan Act](#) in 2018. The Act requires government to set five-year GHG emission reduction goals. It also requires that government consider the advice of the Expert Advisory Council (the Council), an independent group of experts appointed by the Minister of Environment, Climate and Parks (the Minister), when setting these goals (see Section 3):

"When establishing greenhouse gas emissions reduction goals, the minister must take into account the advice and recommendations of the Council."

In June 2019, the Council provided [recommendations to the Minister](#) on the first Carbon Savings Account (2018-2022), including: "Manitoba should set a GHG emissions reduction goal of no less than 1 Mt of CO₂e cumulative emissions reductions." At the time, Manitoba's total GHG emissions at the start of CSA1 were 22.6 Mt in 2018.

Government accepted this recommendation in a [letter](#) on June 10, 2019 and, since then, has been tracking progress based on nationally verified emissions data. The latest available data from the federal government is for 2020 and shows that Manitoba emissions reductions are in line with this goal.¹

CSA1 emission reductions were achieved through several avenues, such as:

- advancing implementation of the renewable fuels mandate;
- introduction of Efficiency Manitoba and its many programs;
- phase out of Brandon 5 coal-fired generating unit ahead of schedule;
- early decommissioning of Selkirk natural gas Generating Station;
- introduction of the Efficient Trucking Program;
- soils, crops and livestock beneficial management practices (BMPs);
- waste diversion.

In keeping with the legislation and its latest mandate letter for the EAC, the Council is now required to provide advice to the Minister of Environment, Climate and Parks on the second CSA for the period of 2023-2027. The Council's aim is to advise the Minister on a goal that will deliver both cumulative and absolute emission reductions over time in Manitoba. The Council has reviewed and updated the Guiding Principles from the first CSA to help the Council frame and assess options for Manitoba.

Using the information gleaned from their engagement efforts, expert and stakeholder advice, their own knowledge and skills, and the parameters set out in The Climate and Green Plan Act, the Council is pleased to provide this report and its recommendations to the Minister.

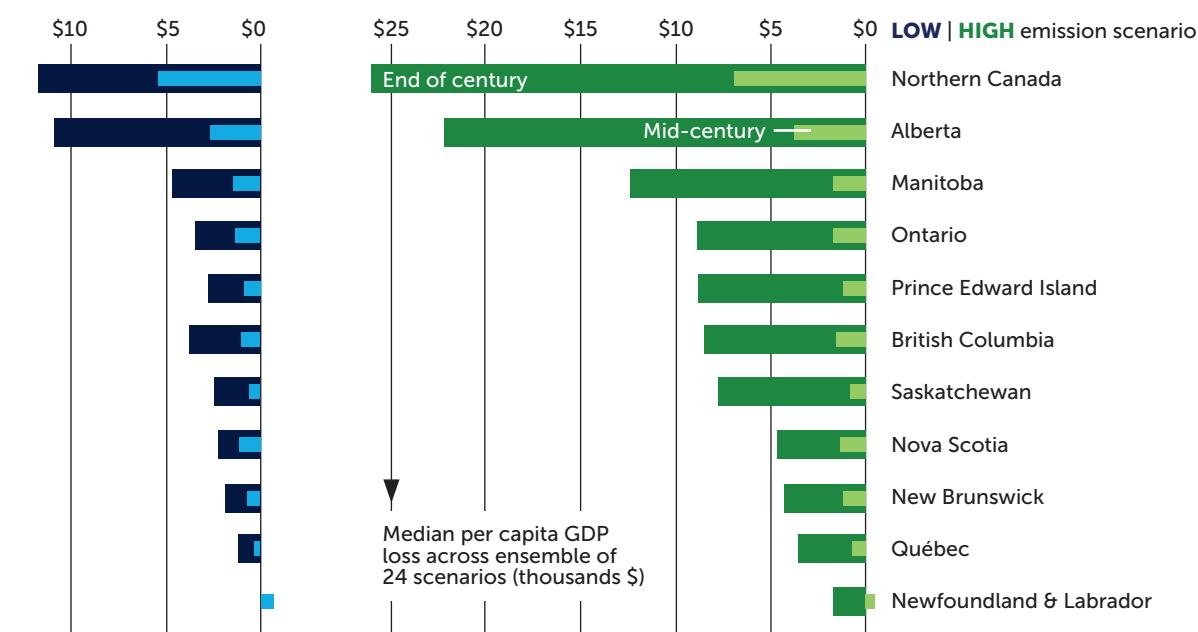
¹ NIR Part 3, En81-4-2020-3-eng.pdf (publications.gc.ca)

3. Urgency for Action

Impacts of climate change are being felt worldwide, and are continuing to grow, with impacts reported across all economies and civil society. The impacts are diverse and widespread reflecting local, national and international vulnerabilities and risks. Economic activity and supply chains are increasingly disrupted due to extreme weather. Greater freeze-thaw cycles are accelerating deterioration of pavements and reduce roadway service life. Higher winter temperatures are rendering winter road networks more unpredictable and of shorter duration. The increasing number of extreme heat days are threatening food production systems and health. Global emission reductions are essential for constraining rising global temperatures to within ranges that society, food production and ecosystems can effectively adapt.

The Canadian Climate Institute's recent report [Damage Control](#) found that a changing climate is a major and growing drag on Canada's prosperity. Manitoba's economy is highly climate-sensitive, ranking third most-sensitive across all Canadian regions in terms of GDP losses per capita (Figure A). While Manitoba could experience GDP increases in agriculture, tourism, and hydro generation under a warming climate, these gains in the *Damage Control* simulations are more than offset by losses due to more, and extreme, weather-related changes. Lowest income households are hardest hit with income losses nearly double the average household impact. Household income losses due to climate change in Manitoba are projected to be 60 per cent higher than the national average. The *Damage Control* report concludes that both reducing global emissions and adapting to climate change can cut the projected costs of climate impacts by 75 per cent.

Figure A: A comparison of GDP loss from climate impacts by province



Source: Damage Control: Reducing the Costs of Climate Impacts in Canada, Canadian Climate Institute, September 2022

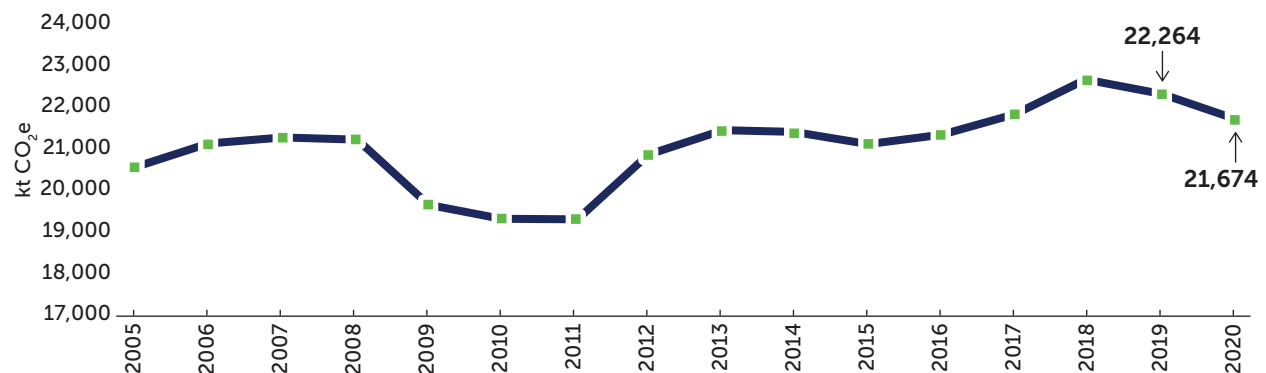
In response, global investors are looking for jurisdictions that provide strong, measurable and consistent leadership on climate change as it signals that risks and vulnerabilities are being better managed. As the international market place evolves, investors are also targeting investment in low-carbon jurisdictions. Manitoba's many businesses that ship to export markets would be recognized as among the most nimble in meeting emission reduction requirements imposed on global supply chains. These competitive advantages build on Manitoba's renewable electricity grid, strong academic and trades training institutions, and the growing international desire for sustainable investments. As one of these jurisdictions, Manitoba becomes a higher-value place to invest, to establish a business, and to call home.

The Council recognizes that investments will be necessary to achieve emission reductions. There are real and increasing costs to delaying action or taking too little action to address climate change and Manitoba must do its part. For Manitoba, doing its part can create significant opportunities. While reductions in emissions come at a cost, the strategic advantage that will be created through low-carbon offerings over the long-term will position the province for prosperity that will benefit all Manitobans.

4. Manitoba's GHG Profile (current state)

Manitoba's emissions increased by an estimated 1.3 Mt (6.2 per cent) of CO₂e over the 2005 to 2017 period (Figure B). Between 2018 and 2020, Manitoba emissions fell by 0.9 Mt. This drop in emissions is associated with provincial and federal climate initiatives and changes in behaviour attributed to the COVID-19 pandemic.

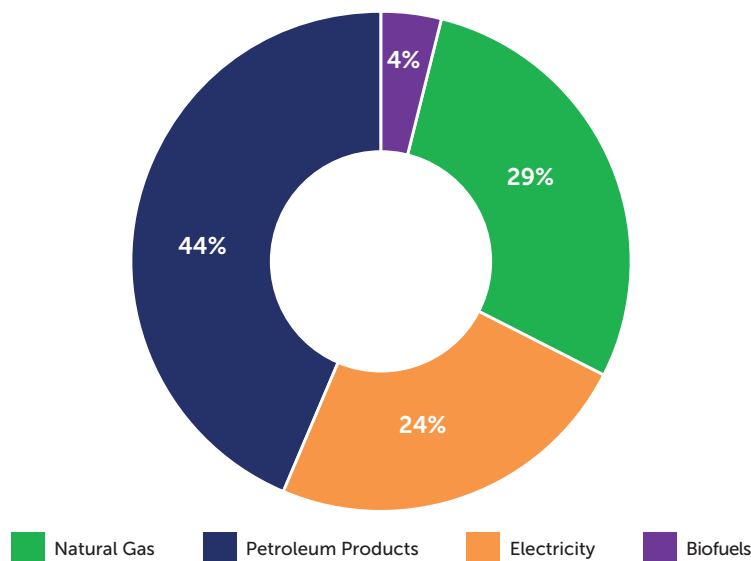
Figure B: Manitoba's Long-Term Emission Trend



(Source: 2022 National Inventory Report, Environment and Climate Change Canada)

Manitoba has been harnessing clean hydroelectricity since 1906, and now has one of the cleanest electricity grids in Canada and in the world. Although Manitoba has the highest percentage of renewable electricity generation among all provinces and territories, it represents only about 30 per cent of the province's energy use. Fossil fuels provide nearly 70 per cent of provincial energy use, primarily for transportation and building heat (Figure C).

Figure C: Manitoba's Energy Use by Source (2019)

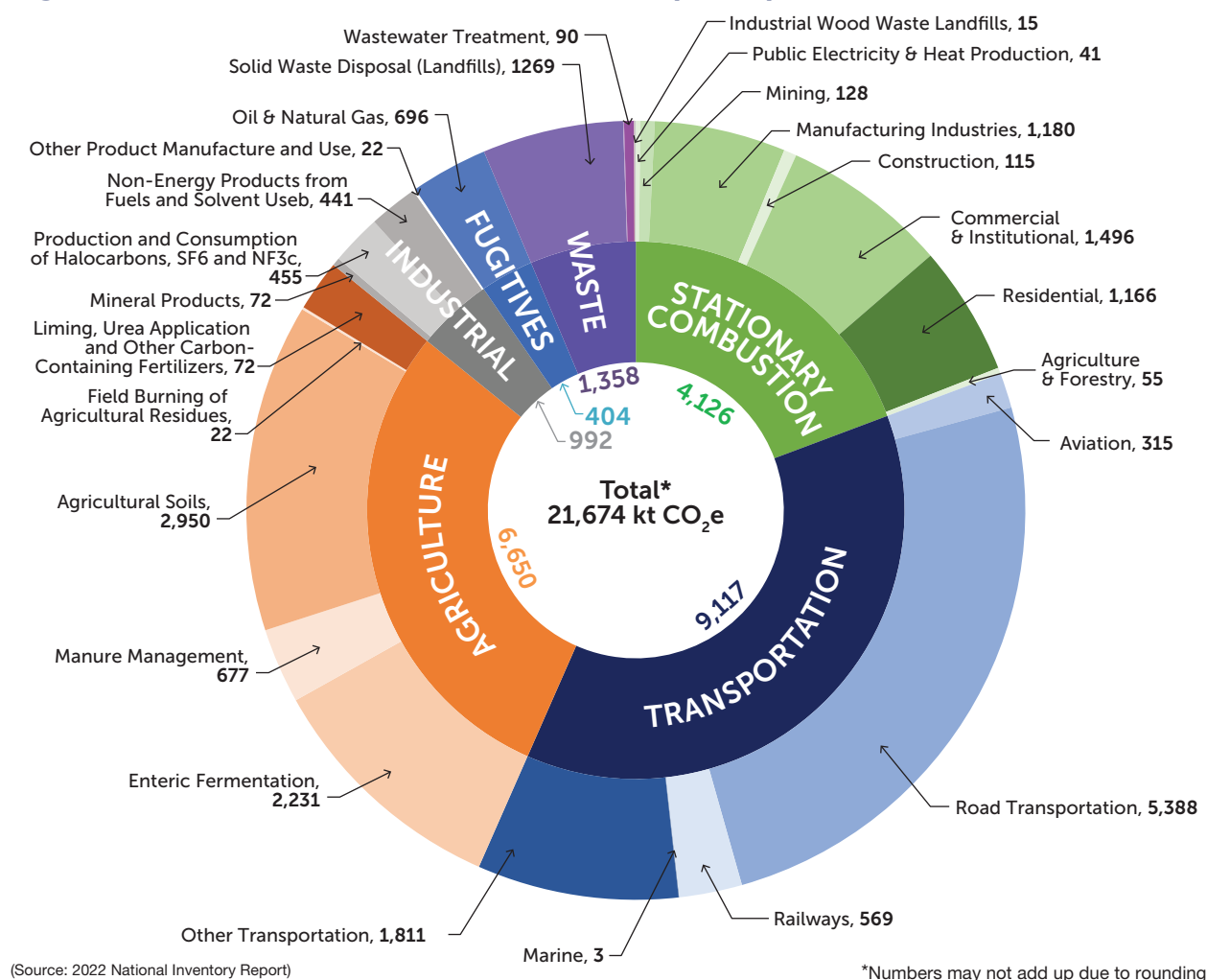


(Data source: CER – Provincial and Territorial Energy Profiles – Manitoba
<https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-manitoba.html>)

According to the most recent National Inventory Report, Manitoba's 2020 GHG emissions totalled 21.7 Mt (Figure D). In Manitoba, the main sources of GHG emissions are:

- gasoline and diesel use in vehicles (transportation) – 8.1 Mt (37 per cent)
- livestock, fertilizer use and emissions from soil above natural background levels (agriculture) - 6.4 Mt (29 per cent)
- natural gas use and other fossil fuels used for building heating (stationary combustion) – 4.2 Mt (19 per cent)
- A relatively small percentage comes from Industrial emissions 1.0 Mt (five per cent) and Waste 1.4 Mt (six per cent)

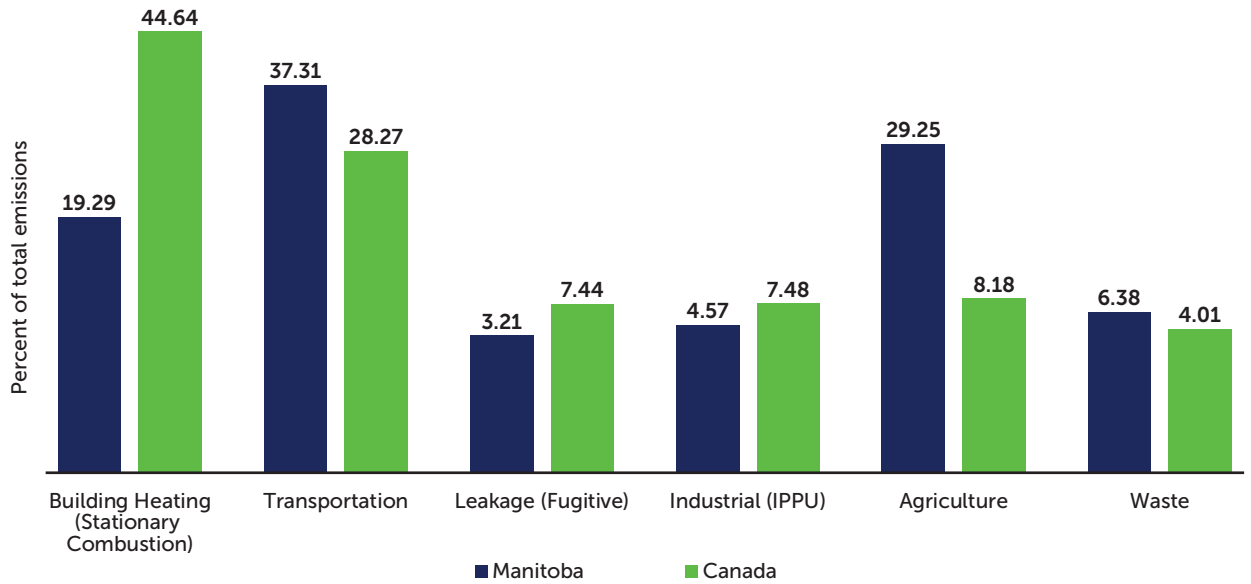
Figure D: Manitoba's GHG Emissions Profile (2020)



While Manitoba accounts for just 3.2 per cent of Canada's total reportable emissions, not advancing a strong emissions reduction plan places Manitoba at a competitive disadvantage relative to other jurisdictions that are investing in decarbonization technologies and energy efficiency measures. Manitoba is well-positioned to transition to a low-carbon economy, and with investment and foresight can capitalize on its clean electricity grid.

Figure E illustrates how Manitoba’s emissions profile differs from Canada’s as a whole. Compared to the rest of the country, Manitoba’s main emissions challenges are linked to fossil fuel combustion for transportation and buildings, and various sources of emissions from agricultural activities.

Figure E: Comparison between Manitoba and Canada’s emission sources (2020)

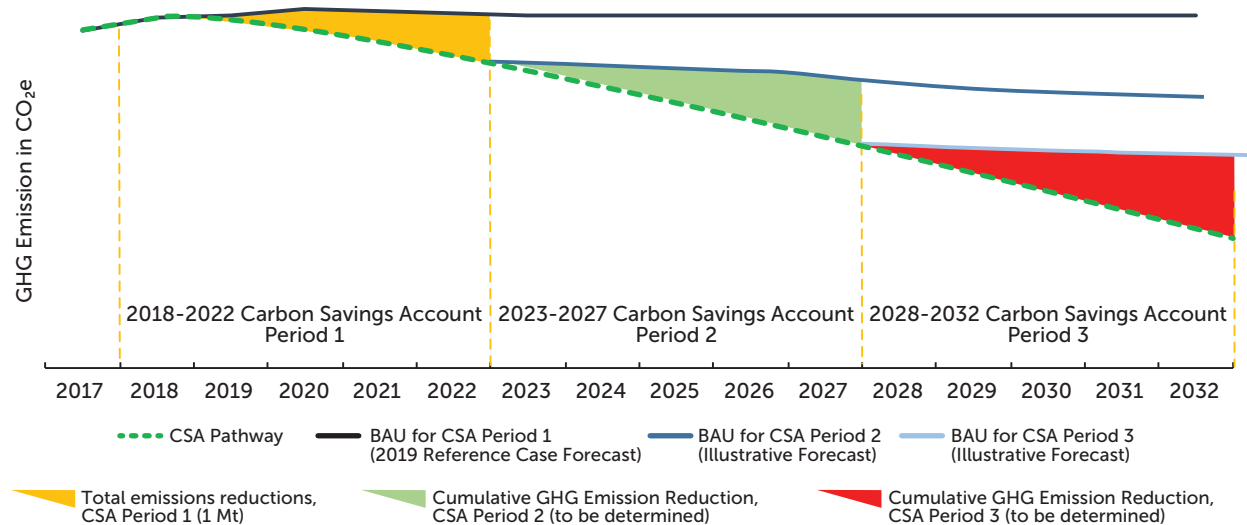


Manitoba’s industrial and agriculture sectors have the potential to reduce emissions by adopting innovative technology (e.g., alternative low or no emissions fuels like hydrogen or renewable natural gas and Carbon Capture and Storage technologies) to address hard to reduce emissions. Large emitters can play a key role with innovations and in showcasing new clean technologies and methods. However, due to the nature of Manitoba’s industrial sector (i.e. few large emitters), GHG emissions reductions will need to come from multiple sources throughout the economy and energy supply system, such as transportation, food production, buildings, and waste management.

5. How is the CSA Calculated?

The carbon savings account (or CSA) is a unique way to drive ongoing emissions reductions for Manitoba. Simply put, it is the sum of all emission reductions over a five-year period on a cumulative basis. This is tracked against a set cumulative emissions reductions goal for those five years. The emissions reductions are the 'carbon savings.' The tracking against that goal is the 'account'. The approach to setting CSA2 follows the same approach used to set the CSA1 (Figure F).

Figure F: Illustrative BAU scenarios and CSA Goals for each CSA period



Source: ECCC's 2019 Reference Case Forecast

It is common to measure and report GHG emissions on an annual basis. However, many GHGs persist in the atmosphere for decades or even centuries, having a cumulative impact on the climate. When developing policies to address GHG emissions, it is important to consider the impact of cumulative emissions, not just annual emissions. Therefore, each CSA period is assigned a cumulative emissions reduction goal for the whole five-year time frame. That goal will be achieved by implementing a set of specific emissions reduction actions to occur within the five-year CSA. Those actions will continue into subsequent CSA periods, with new emissions reduction measures building off the previous measures.

The Council recognizes the objective of each CSA period is to build on the prior period and produce sustained emissions reductions to:

- reduce the total amount of carbon emissions that would otherwise be generated in Manitoba without emissions reduction measures from a "business-as-usual" (BAU) forecast;
- reduce the absolute level of carbon emissions in Manitoba measured from the start and end points of each CSA; and
- 'bend the curve' of provincial carbon emissions downward over time in Manitoba so sustained emissions reductions occur by ensuring fewer emissions are occurring over each five-year CSA period, compared to the BAU.

6. Pathway to Recommendations

6.1 Guiding Principles

The Council established a set of principles to guide the Council when advising and recommending a goal for the first CSA period from 2018-2022. The Council has updated the original principles in establishing the 2023-2027 goal. The Guiding Principles are as follows:

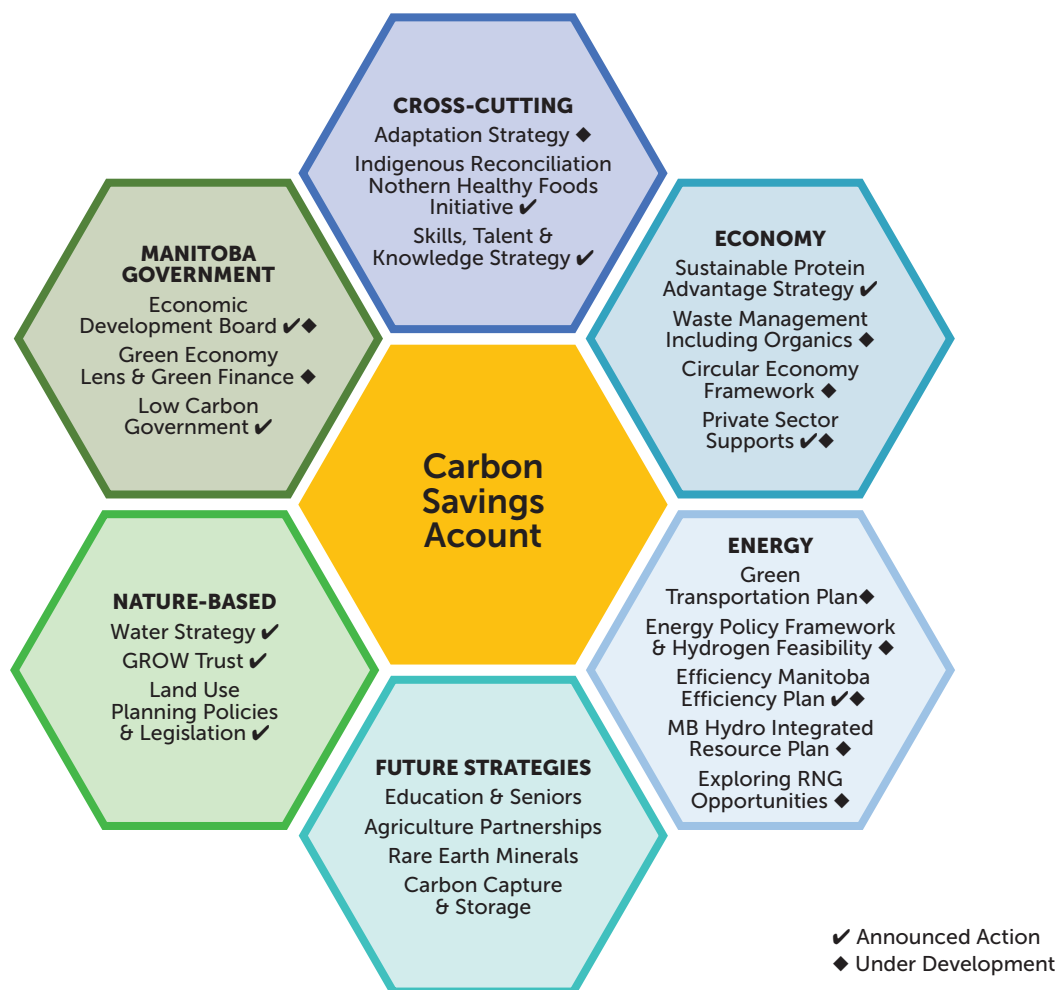
- **Urgent** – Global scientific consensus urges that all jurisdictions, regardless of emissions profiles, must take action quickly. There is acknowledgement that the planet is in a climate emergency and immediate and strong effort must be taken to reduce GHG emissions.
- **Effective** – The goal, and recommended pathways to reach the goal, are both effective in reducing emissions, and cost-effective. Ongoing tracking of meaningful objectives is crucial in measuring effectiveness.
- **Efficient** – Evaluate and implement emissions reduction opportunities guided by potential for successful implementation, highest value-for-money and value-for-effort, including Manitoba's global competitiveness in a future low-carbon economic environment.
- **Achievable** – There are reasonable and viable potential pathways to achieve the goal.
- **Transparent** – The goal, and the analysis behind it, is transparently set out. There are opportunities for informed, ongoing public discourse on Manitoba's progress towards the goal.
- **Evidence-Based** – The goal is based on solid evidence and analysis, including economic modeling. Where appropriate, this may also include learning and adopting proven approaches from other jurisdictions.
- **Dynamic** – The goal can be added to within each CSA period. This also includes the ability to try new strategies and change tack as needed, including embracing technological advances and innovative approaches, where appropriate, to help meet the goal. It also means that there is a desire to learn from past CSA periods and to improve.
- **Fair Distribution and Contribution** – The goal implies a fair and reasonable contribution of effort by emitting sectors and provides opportunities for all Manitobans to contribute.
- **Reconciliation** – Decisions should support reconciliation with Indigenous communities and take into account whether and how each CSA, related policies, programs and measures and any other recommendations made by the EAC will support the development of Indigenous-led businesses, projects and economies.
- **Sustained Reductions** – The goal and recommended pathways lead to sustained emissions reductions.
- **Sustainable Development** – The goal and recommended pathways to reach the goal reflect the principles of sustainable development and the importance of both a healthy environment, a strong economy, and a thriving community. The social aspect should include consideration of low-income communities.

The Council applied these principles in its analysis and assessment towards recommending a new CSA goal and pathways available to achieve the goal.

6.2 Alignment with Manitoba Strategies, Climate and Green Plan

The Council recognizes that government policies should be mutually supportive or, at least, should not weaken their respective purposes. The CSA is a tool that affects, and is itself influenced, by policies, strategies and plans developed across the provincial government as well as other levels of government. The CSA and economic policies must align to keep Manitoba companies in sync with global capital markets. Figure G below identifies some key policy areas with links to the CSA that the province has announced, or is in the process of developing.

Figure G: Linked Provincial Policies and Actions



6.3 Expert Guest Speakers and Panel Discussions

Recognizing that each sector is unique, the Council was keen to hear from key sector representatives who could shed light on the challenges and opportunities to achieve GHG emissions reductions. Over the course of the last several months, the Council met with representatives from a variety of sectors via an Expert Guest Speaker Series and panel discussions. These representatives included speakers from across the province representing private and public organizations, municipalities, industry associations from various sectors, non-profit organizations, as well as agricultural producers, and academics. One of the key presentations and discussions was with Efficiency Manitoba. Manitoba Hydro was unavailable to participate and provided the EAC with existing publications to support the Council's work and deliberations. See Appendix D for a list of organizations that presented to the Council.

6.4 Additional Stakeholder Input

In addition, the Council conducted a targeted call out to key stakeholder organizations. While these stakeholders were invited to provide written submissions, the Council also ran an EngageMB survey from Nov. 15-26, 2022 to encourage sector representatives to provide input into the next CSA goal. The survey responses helped the Council validate what it had heard about the opportunities and challenges in various sectors in Manitoba specifically:

- current actions and plans to reduce GHG emissions
- barriers that are preventing more effective GHG emission reductions and
- how government can best support GHG emission reduction over the next five years

Others provided written comments to the Council or directed Council to available reports. The Council benefitted from net-zero research conducted by the International Institute for Sustainable Development, and Dr. Chris Bataille of the Institute for Sustainable Development and International Relations, as well as the modeling and research outlined in Appendix E.

All government departments were also presented with the opportunity to provide input and the Council engaged directly with several that provided briefings on key strategies or policies. The Council was briefed on key strategies under development, including the Manitoba Protein Advantage Strategy, the long-term Energy Strategy for Manitoba and the Green Transportation Strategy (based on Council recommendations), as these have strong connections to the CSA goal.

6.5 Feedback from an Indigenous Perspective

The Council reached out to Indigenous organizations, all Manitoba First Nations and the Manitoba Métis Federation for their perspectives into the next CSA goal. They were invited to provide written submissions, engage through an EngageMB survey or a paper survey, or otherwise meet in-person.

Over the years, Manitoba has engaged with Indigenous people on a number of issues related to energy and climate. Throughout these engagement sessions, many recurring issues were heard. A summary of the recurring issues was shared with the EAC and were considered during the development of the CSA2 recommendations. The following summarizes the main themes:

- Indigenous communities have expressed interest in clean and affordable energy.
- Economic development opportunities for Indigenous communities and people are a priority, including income, employment training, funding and business opportunities.
- There is a need for resiliency and reliability in the face of a changing climate.
- Energy efficiency for Indigenous-owned buildings and appliances is of critical interest.
- Respect for Indigenous rights and interests is necessary when energy projects are developed.
- Respect for the needs and circumstances of future generations should be considered in decisions.
- Respectful use of Indigenous knowledge should be considered to plan, develop and operate energy projects.
- Respect for the environment and importance of environmental and human health protection (e.g., land, water, air, heritage and cultural resources, fisheries and wildlife) also needs to be considered.
- Acknowledging and addressing the legacy of past development, including environmental, social, economic and cultural impacts that continue to be experienced today is important.

6.6 Economic Modeling and Technical Advice

EnviroEconomics provided technical advice to the Council and information to help evaluate various emission reduction goals and to identify and evaluate potential pathways for reducing Manitoba's emissions for the CSA2 period and beyond.

The Business-As-Usual Projection is the base on which emission reductions are calculated. The BAU projection for CSA2 was based on the latest available projection for Manitoba (i.e., 2022 Reference Case projection) from Environment and Climate Change Canada (ECCC). The BAU reference case includes actions taken by governments, consumers, and businesses up to Sept.2022 that are expected to influence emissions reductions.

EnviroEconomics reviewed existing models and modeled "With-Additional-Policies" projections for the Council. These projections demonstrate how Manitoba's emissions would change if different policies/actions were applied. The projections include:

- ECCC's modeling of the federal Emissions Reduction Plan published in March 2022, which reflects a wide range of legislated policies, but also proposed policies that are under development.
- the Canadian Climate Institute's independent review of the federal Emissions Reduction Plan – three scenarios were modelled by Navius Research, corresponding with three levels of policy stringency, reflecting increasing uncertainty in policy design and implementation.
- modeling completed by Navius Research for the Canadian Climate Institute assessing Canada's Net-Zero Future, including 62 scenarios from which low, median, and high projections were developed for Manitoba.
- additional modelling completed by Navius Research and Dunskey Energy + Climate Advisors to model a wide range of emissions pathways and policies to 2030 and net-zero.

The modelling conducted by EnviroEconomics provided the Council with analysis to evaluate the variety of possible CSA goals and pathways. Upon viewing the results, the Council narrowed down a range for consideration. Factors considered included the guiding principles (Sec 8.1) that take into account cost effectiveness, efficiency, affordability etc., as well as input from key sector experts, stakeholder feedback, alignment with other strategies and the Climate and Green Plan, and Manitoba's place in the larger context of Canada and the world.

6.7 Alignment with Federal Goals and International Goals

Responding to the growing urgency to address the global impacts of climate change, Canada joined over 120 countries to commit to net-zero emissions by 2050. Under the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC), countries agreed to collectively strengthen the global response to climate change, including by limiting global warming to well below 2°C, while also pursuing efforts to limit warming to 1.5°C.

In 2021, Canada committed to cut its GHG emissions by 40-45 per cent below 2005 levels by 2030. The following year, Canada announced the 2030 Emissions Reduction Plan (ERP) under the Canadian Net-Zero Emissions Accountability Act to support action across sectors. This is a national goal reflecting jurisdictional differences in emission reduction opportunities. Some jurisdictions have more immediate actions that can be taken to reduce emissions, such as cleaning their energy grid, while the time frames for others to achieve effective reductions are dependent on external factors, such as when technology and strategies are more widely available.

7. Recommendations for 2023-2027 Carbon Savings Account

7.1 Set an Ambitious but Achievable Goal

The Council recommends the following for CSA2:

The Minister establish an ambitious, but achievable 5.6 Mt cumulative emission reduction goal for the 2023 to 2027 target period. This goal is consistent with the level of reductions required for Manitoba to be on a path to net-zero emissions, while at the same time positioning Manitoba to prosper in the global shift to low-carbon economic growth.

The Council offers additional supplementary advice as follows:

7.2 Establish a Path to Net-Zero

Many governments at the national, subnational, and local levels have set net-zero targets for their respective jurisdictions. Under the Paris Agreement, Canada has announced a net-zero target by 2050. To achieve this target, action is required by all Canadians, including Manitobans. The Council recommends that Manitoba commit to this target and set a path to achieve net-zero emissions by 2050.

Net-zero refers to human-caused greenhouse gas emissions going into the atmosphere are removed from the atmosphere.

7.3 Strive to Achieve Deeper Emissions Reductions

The EAC encourages government throughout this CSA period to monitor opportunities for additional actions and measures to drive emission reductions toward 8 Mt during CSA2. The EAC recognizes that driving toward further emission reductions will be influenced by many factors, and presents some challenges for Manitoba. Modeling indicates that, under the right circumstances, deeper reductions may be achievable. Under these conditions, Manitoba should increase the level of effort and ambition further in order to transition to the future green economy.

7.4 Take Action Across all Sectors

The Council recommends that Manitoba consider actions across all sectors, and notes that major sources of GHG emissions in Manitoba stem from many small individual sources including transportation, agriculture, stationary combustion, and waste. Important to achieving the CSA goal will be implementing key strategies and frameworks that are under development at time of writing, including the Energy Policy Framework and the Green Transportation Plan.

Advancing existing local municipal plans, such as those of the City of Selkirk and the City of Winnipeg, and supporting the development and implementation of other municipal plans will be important. Working in partnership with Manitoba's Indigenous peoples can also produce emission reductions with additional co-benefits.

Based on Manitoba's current emissions profile, current and proposed policy portfolio and inputs from various sector-specific experts, the following is recommended by sector:

Transportation

Modeling results indicate that emissions from transportation sector can be reduced by 14 to 25 per cent in the CSA2, which will result in a cumulative emissions reduction between 3.0 Mt to 6.5 Mt.

The following options to achieve these reductions are recommended for consideration:

- develop Zero Emission Vehicle (ZEV) mandates and incentives (e.g., sales targets, procurement targets for government fleets, feebate system)
- expand ZEV charging/refuelling networks
- maximize the use of biofuels and other low carbon fuels to reduce the use of fossil fuels in vehicles still on the road and to support hard-to-electrify medium and heavy duty vehicles
- support public and active transportation
- continue with grant programs, such as the Efficient Trucking Program.

Multiple measures taken together will generate the projected emissions reductions. For example, for every 10,000 ZEVs registered in Manitoba, there will be a reduction of GHG emissions by 47,000 tonnes annually, which is an approximately 235,000 tonnes cumulative reduction over a five-year period. Similarly, biofuel blending will reduce emissions in the current stock of internal combustion engines and will reduce emissions from heavy-duty vehicles and other hard-to-electrify vehicles. For every one per cent increase to biofuels blending mandates, GHG emissions can be reduced by over 60,000 tonnes annually, or 300,000 tonnes cumulatively over a five-year period.

Other options will set the stage for future reductions, by encouraging broader adoption of technologies and growing the systems needed to support change. For example, implementing policy to advance the transition to zero emission vehicles in CSA2 will be key to building certainty and confidence to increased adoption in CSA3.

Buildings

Building retrofits and new construction can reduce emissions from the building sector between 19 to 25 per cent, contributing a cumulative reduction between 2.5 Mt to 3.2 Mt in CSA2.

The following actions to reduce emissions are recommended for consideration:

- continue to adopt the latest national building code in a timely fashion and ensure widespread training to ease implementation
- support deep energy retrofits in existing buildings through various means
- expand opportunities to use geothermal heating through programs
- introduce a dual fuel strategy for heating

Just as targets for electric vehicles can drive policy and program implementation, targets for the uptake of ground source and air exchange heat pumps as part of dual fuel systems can also drive long-term reductions. Expanding Efficiency Manitoba's customer offerings will be beneficial to electrifying building energy systems and switching to lower emitting alternatives to fuel oil and propane for heating in rural areas, especially in remote Indigenous communities.

Industry

Modeling results indicate that emissions from the industrial sector can be reduced by 15 to 25 per cent in CSA2, which will result in a cumulative emission reduction between 0.5 Mt to 0.8 Mt. In this CSA2 period, there is considerable opportunity to work with industry to identify investments to move to low or zero emissions energy sources towards the end of CSA2 or in CSA3. This will require active participation from the private sector, as well as actions and funding to support equipment upgrades (e.g., Low Carbon Economy Fund merit-based programs, Conservation and Climate Fund, funding to support pilot projects, and funds to support front end engineering design studies).

Agriculture

Improvements in agriculture energy-related activities can provide approximately 1.25 per cent of agricultural emission reduction, contributing about 0.2 Mt cumulatively during the CSA2 period. Emissions from agriculture are not from a single point. They result from complex interactions between nature and human activities across 7.7 million hectares of land. Adding complexity is the fact that agriculture can be a carbon sink as well as a source of GHGs. Improvements in non-energy agricultural activities such as land-use changes and improved fertilizer application, can contribute more emission reductions in the sector.

The Council specifically notes the difficulties related to reducing emissions in this sector. Manitoba must support farmers in their actions to reduce emissions while growing food and bio-products. Providing incentives for early adopters will support experience, build knowledge and raise confidence in the applicability of best practices and measures that will help to reduce emissions over time.

Measures that Manitoba can undertake to advance emissions reduction through policy and programing include:

- expanding programs to research, evaluate and support producers in adopting locally relevant, climate-smart Beneficial Management Practices (BMPs) with particular attention to:
 - management of forage, pasture and range lands
 - emissions from enteric fermentation
 - production and utilization of pulses and oilseed legumes
 - crop nutrition practices optimized for crop productivity and the path to net-zero (e.g., 4R techniques)
 - increasing the amount of carbon stored in agricultural soil
- improving renewable electricity distribution infrastructure for farms and rural areas and supporting the use of renewable energy in farm buildings and to power farm equipment
- establishing programs to interpret and extend climate change capacities to agricultural producers in their local context
- leveraging the Conservation and GROW trusts to better align with emission reductions and avoidance targets

Waste

Programs to support 20 to 22 per cent cumulative emissions reduction in the waste sector have the potential to reduce emissions by 0.8 Mt to 1.0 Mt in CSA2.

Opportunities recommended for consideration include:

- advancing organics waste management
- expanding methane capture at landfills
- enhancing ozone depleting substances management
- advancing strategic waste management in the context of a circular economy

Moreover, multi-sector policy, such as a Renewable Natural Gas Standard requiring that 15 per cent of gaseous fuel consumption (by energy content) outside the oil and gas sector be from renewable sources (e.g., waste) by 2030, could achieve an estimated 3 Mt cumulative GHG reduction.

Energy

It is recommended that the province take the necessary steps to ensure that the provincial Energy Policy Framework is integrated into plans and actions of influential actors, such as Manitoba Hydro and Efficiency Manitoba, and that progress is regularly reported. The province could also set targets to advance availability and use of low-emitting fuels in key areas including biofuels, renewable natural gas, and hydrogen. Manitoba should evaluate areas for federal-provincial collaboration to support decarbonization within the industrial sector.

Municipalities, Northern Affairs and Indigenous Communities

Supporting all Manitoba municipalities and Northern Affairs communities, as well as Indigenous Nations to take climate action, is key to maximizing provincial efforts. The following actions are recommended for consideration:

- Key opportunities for emissions reduction are implementation or improvements to multi-modal transportation systems in urban and rural areas and active transportation systems.
- Communities have a close relationship with residents and can be key to advancing the understanding and comfort with emission reduction opportunities, increasing awareness of funding opportunities and understanding the types of energy efficiency improvements available.
- Helping communities identify and access available funding from federal, provincial and other sources will help to reduce the burden on communities and Indigenous Nations while also stimulating local economic activity.
- Further advancing reduction of fossil fuel use and community renewable energy projects in northern, off-grid, and remote Indigenous communities will be beneficial.

EAC specifically highlights additional concerted efforts to collaborate with Indigenous peoples to identify emission reductions, such as energy efficiencies and appropriate pathways for fuel switching, including:

- leveraging success stories, such as to those already happening with Efficiency Manitoba, where Indigenous-specific energy efficiency programs are being developed and evaluated with direct input from Indigenous representatives
- supporting the use of emerging technologies, while meeting other community objectives, such as reliability, local employment and safety
- identifying gaps, and working collaboratively with the federal government to strengthen programs to support Indigenous decarbonization efforts, an approach that can advance reconciliation, foster economic development, and directly and indirectly support other priorities of Indigenous peoples
- working with Manitoba Hydro to address the policy areas that can assist Indigenous communities with pursuing alternative energy technologies that connect to the energy grid system

Additional Actions

The Council also recommends Manitoba enact, or undertake, other measures that will indirectly support emission reductions in the province as follows:

- address policy review and implementation to remove policy barriers and perverse or misaligned incentives across all sectors and Crown corporations
- assist Manitoba businesses through policies and programs in meeting global supply chain requirements for reduced emissions
- ensure labour procurement and training programs align to the demands for building retrofits, alternative renewable energy sources, low emission farming and northern energy.
- support industrial decarbonization and building energy emission reduction, framing policy and targets for blending of renewable natural gas (RNG) with natural gas distribution systems
- assist in addressing the challenges around accessing federal decarbonization funds; the province has a key role to play to understand those challenges and work with Canada to identify solutions so that Manitoba sectors can take full advantage of federal supports to further advance emission reduction opportunities
- renew low carbon government efforts to encourage government and government-related entities (e.g., universities, hospitals, Crowns, schools) to develop and implement climate action plans and advance emissions reduction projects; government business practices can play a leadership role in market transformation for a low carbon economy. Adopting climate forward policies and practices creates certainty and confidence for business investment and establishes standards of practice and performance. Changes in government practices can also have a significant impact on their own.
 - Replacing 30 per cent of the government fleet with ZEVs, could result in approximately 26,000 tonnes of cumulative GHG emission reduction for CSA2.
 - A 30 per cent reduction in natural gas use in government buildings could result in an approximate 800,000 tonnes of cumulative GHG emission reduction for CSA2.
- Exploring alternative fiscal instruments and stimulus to more quickly increase the uptake of emission reduction technologies and actions, including green bonds to encourage government investment, and lending vehicles that support the capitalization of energy efficiency projects in buildings would be beneficial.

Manitoba's economy will be exposed to considerable risk if it does not look to keep pace with other jurisdictions on decarbonization. Setting ambitious emissions targets and actively pursuing pathways to achieving them will ultimately benefit the province by encouraging technological adoption and modernization. This, in turn, will support efficiencies, reduce the amount of capital leaving the province to pay carbon taxes and imported fossil fuels and increase available capital for reinvestment in the local economy. Collectively, this will help to ensure Manitoba remains attractive to both business and residents. The Council recommends that the Minister take concrete steps to ensure that policies and measures during CSA2 are implemented and monitored to achieve emission reduction benefits and support progress in CSA3.

7.5 Be Prepared to Add to its CSA2 Goal Pending CSA1 Results

Calculations of whether or not Manitoba met the CSA1 target (2018-2022) are based on data from the National Inventory Report produced by the federal government. Manitoba has been tracking progress based on this nationally-verified emissions data. The latest available data is for 2020 and shows that Manitoba's emission reductions are in line with this goal. However, the actual data for the 2018-2022 period will not be available until 2024, due to an 18-24 month delay in publishing the National Inventory Report. In the event that there is a shortfall from the CSA1 goal, it must be added to the CSA2 goal. Given progress to date, it is unlikely that the target will be missed, but if that occurs, it is not projected to be by a significant amount.

7.6 Preparing for CSA3

The Council also suggests that the Minister set in place policies, programs, and measures in CSA2 that may require significant lead time, but that will eventually deliver measurable GHG reductions. The five-year CSA goals with annual reporting requirements help keep Manitoba on track or make the necessary adjustments to achieve real GHG reductions in the near-term. However, the path to net-zero requires actions to be started now in order to achieve reductions in future CSA periods. The Council suggests the following actions:

- Establish a net-zero legislation for the province.
- Align the mandate of Crown corporations (e.g., Manitoba Hydro, Efficiency Manitoba) to include climate actions and GHG reduction goals (e.g., net-zero 2050), leveraging leadership from those Crown corporations that have set emission reductions targets and are actively working towards achieving them, such as Manitoba Liquor and Lotteries Corporation.
- Provide additional programs and incentives for increased uptake of emerging technologies, such as heat pumps (including heat pumps for water heaters).
- Develop and introduce a provincial clean hydrogen standard to ensure that hydrogen production will be from clean sources.
- Provide funding for pilot projects and emerging technologies, FEED studies and ready-projects that support industrial electrification (e.g., Conservation and Climate Fund) and increase funding for projects that reduce GHG emissions.
- Set up for significant future agriculture sector emission reductions.
- Work with the federal government to maximize emission reduction opportunities for the reinvestment of carbon revenues particularly for industry, as well as municipalities, universities, schools and hospitals.
- Support targeted nature-based solutions that require time to establish before becoming fully effective, focusing on actions with demonstrable emission reductions and optimizing co-benefits, such as adaptation and biodiversity.

8. Council's Continued Engagement

The Council provides advice on the implementation of the Climate and Green Plan to the minister and will continue to assess opportunities to support emission reductions in Manitoba as it considers other aspects of its mandate priorities.

The Council recommends that, in order to achieve further transparency about the CSA, an annual "report card" be released by the province to update Manitobans on progress towards the 5-year GHG emission reductions goal. This is in addition to annual reporting completed by the department. This information should be easily accessible to the public. The report card could use both quantitative and qualitative data and indicators as appropriate. The report card would help to keep Manitobans informed and engaged on the progress of GHG reductions in the province. This will ensure that the goal continues to influence decisions throughout the CSA period.

The Council also recommends that climate action with Indigenous communities and organizations be advanced by building relationships and increasing opportunities for sustained dialogue and idea sharing through a discussion table established specifically for climate and energy.

9. Closing Remarks

Manitoba has a unique opportunity to contribute positively to addressing climate change. Manitoba can be a leader in the green economy and can attract business and people who have shared values that will position Manitoba to prosper in a low-carbon economic future.

We encourage Manitoba to:

- Adopt the EAC's recommended 5.6 Mt of CO₂e goal for CSA2 and establish a path to net-zero by 2050.
- Strive to achieve deeper emissions reductions during CSA2, actively looking for emerging opportunities.
- Recognize that Manitoba accomplished the bulk of its quick hits in CSA1 and that the progress going forward will stem from changes in each and every business and household – from shifting energy sources for industrial process, to building energy upgrades, to shifts to ZEVs.
- Learn from lessons from the first CSA 2018-2022, including the importance of taking action that sets the stage for reductions in the next; CSA3 carbon savings account (2028-2032).
- Support this transition, including directing additional work across departments, to identify and fine-tune policy responses to the Council's recommendations.

The Council encourages the Minister to remain mindful that emission reductions will be challenging, but at the same time will transform the economy and move Manitoba away from imported fossil fuels. It is Manitoba's responsibility to do its share to address climate change now, and for years to come.

10. Appendices

Appendix A - Abbreviations

4R	Right Source of fertilizer used at the Right rate, at the Right time and in the Right place
BAU	Business As Usual
BMP	Beneficial Management Practice
CCUS	Carbon Capture Utilization and Storage
CO ₂ e	Carbon Dioxide Equivalent
CSA	Carbon Savings Account
CSA1	First Carbon Savings Account (2018-2022)
CSA2	Second Carbon Savings Account (2023-2027)
CSA3	Third Carbon Savings Account (2028-2032)
CCF	Conservation and Climate Fund
EAC	Expert Advisory Council
ETP	Efficient Trucking Program
EV	Electric Vehicle
ECCC	Environment and Climate Change Canada
FEED	Front End Engineering Design
GHG	Greenhouse Gas
IPPU	Industrial Processes and Product Use
kt	Kilotonne
LCEF	Low Carbon Economy Fund
IRP	Integrated Resource Plan
Mt	Megatonne
NZ	Net-zero
RNG	Renewable Natural Gas
WiaP	With additional policies
ZEV	Zero Emissions Vehicle

Appendix B – Glossary

Biodiesel – Biodiesel is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats and produced using an accepted industry-wide quality assurance program. Safe, non-toxic and biodegradable, fuel is typically made from vegetable oils or used cooking oils. Biodiesel manufacture is a relatively simple process that uses an alcohol (usually methanol) to convert animal tallow, plant oils and other biomass-based oils (fatty acids) into combustible fuels (esters). Biodiesel can be used in its pure form or blended with conventional diesel at various levels with little or no engine modifications.

Carbon Dioxide Equivalent – CO₂e is an internationally accepted measure that expresses the amount of global warming potentials from various greenhouse gases. It is expressed in terms of the amount of carbon dioxide (CO₂) that would have the same global warming potential.

Clean Electricity Grid – Over 99 per cent of the electricity generated in Manitoba comes from renewable sources, which is then distributed through our clean electricity grid, sometimes known as the clean energy grid.

Decarbonization – Decarbonization refers to reducing greenhouse gas emissions, mostly from fossil fuels used throughout the economy.

Efficiency Manitoba – Efficiency Manitoba is a Crown corporation that provides programs and initiatives to increase energy savings. The Efficiency Manitoba Act currently mandates a provincial reduction of electricity consumption of 1.5 per cent and 0.75 per cent of natural gas consumption annually.

Emissions – The release of pollutants that can be transformed into greenhouse gases, and/or the direct release of greenhouse gases, into the atmosphere over a specific area and period of time.

Emissions Reduction Plan (ERP) – Canada's 2030 ERP outlines the actions to support Canada's greenhouse gas emission reductions target of 40-45 per cent below 2005 levels by 2030, and to put the country on a path to net-zero emissions by 2050.

Ethanol – Ethanol is a high-octane, water-free alcohol that is produced from renewable resources, such as corn, wheat, straw and other biomass. Ethanol can be used as a fuel, as an additive to fuel or fuel extender, or as an industrial chemical. When ethanol is blended with gasoline, the result is a cleaner, higher-octane fuel than regular gas.

Fossil Fuel – A general term for liquid, solid, and gaseous types of combustible carbon deposits of biological origin, including coal, oil, natural gas, oil shales and tar sands. These fuels emit carbon dioxide into the atmosphere when burned, significantly contributing to the greenhouse effect and climate change.

Greenhouse gas – Any gas that absorbs infrared radiation in the atmosphere is called a greenhouse gas. Greenhouse gases include water vapour, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), halogenated fluorocarbons (HCFCs), ozone (O₃), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆), and hydrofluorocarbons (HFCs).

Manitoba Hydro – Manitoba Hydro is a provincial Crown corporation and one of the largest integrated electricity and natural gas distribution utilities in Canada. The corporation is subject to The Manitoba Hydro Act and currently subject to review by the Public Utilities Board, the Clean Environment Commission and by the provincial department of Environment, Climate and Parks.

National Inventory Report – Canada's National Inventory Report is the official national greenhouse gas inventory submission to the United Nations Framework Convention on Climate Change. It includes an inventory of human-induced emissions by source, and removals by sink, of all greenhouse gases not controlled by the Montreal Protocol.

Paris Agreement – The Paris Agreement is a legally binding international treaty on climate change. Canada was one of 196 Nations to adopt the Agreement in 2015. Its goal is to limit global warming to well below two degrees Celsius, preferably to 1.5 degrees, compared to pre-industrial levels.

Net-zero – Net-zero emissions means that anthropogenic emissions of greenhouse gases into the atmosphere are balanced by anthropogenic removals of greenhouse gases from the atmosphere over a specified period. (Canadian Net-Zero Emissions Accountability Act).

Renewable Diesel – Renewable diesel is biomass-based fuel that is almost chemically identical to premium petroleum diesel and burns cleaner than conventional diesel fuel. It can be produced from any organic feedstock by using hydrogen to crack big molecules into smaller ones, and then adding hydrogen to these smaller molecules to produce a renewable biofuel for use in diesel engines at any ratio and in all seasons. It is regulated as an eligible biofuel, and contributes to blending compliance under the Biodiesel Mandate in Manitoba.

Value-for-Effort – Value-for-Effort is a method to prioritize opportunities or features to effectively and clearly evaluate options

Value-for-Money – Value-for-money refers to a standard accounting practice that assesses whether the use of funds or resources is economical, efficient and effective in a project or entity.

Appendix C - Biographies of EAC members

Edward Onyebuchi, Chair

Edward Onyebuchi (Winnipeg) worked as a senior economic consultant at Manitoba Hydro for 26 years, where he provided business case and economic impact analysis for major capital projects and on corporate activities related to sustainable development, climate change and other environmental matters. He also worked internationally in electric power utilities in China, Liberia and Saudi Arabia, through Manitoba Hydro International. He previously worked for the Manitoba government as a senior policy analyst, where he coordinated the Sustainable Development Strategy. Edward Onyebuchi holds a Master's degree in Natural Resources Management from the University of Manitoba and a PhD in community and regional planning from the University of British Columbia.

Andrew MacSkimming, Vice-chair

Andrew MacSkimming (Winnipeg) is a lawyer and owner of A.H MacSkimming Law Office. He has been a practicing lawyer since 2005 and has also worked as a senior policy advisor for the federal Office of the Minister of the Environment (2006 to 2007). He previously worked as a lawyer and articling student with Environment Canada Legal Services, and as a research analyst with a leading energy consulting and brokerage firm. Andrew MacSkimming has also served in a variety of public roles, including as chair of the Manitoba Bar Association's Environmental, Energy and Resources Law Section. He holds Master of Laws degree in Environmental Law (2004).

Bob Adamson

Bob Adamson (Winnipeg) is the chair of Nutrients for Life Canada, a national educational foundation that focuses on sustainable nutrition, and currently sits on the International Science Schools Network Executive. Bob was the STEM program leader for Pembina Trails School Division until his retirement in June 2021, as well as the Founder and Director of a provincial ag biotech program that has already reached over 26,000 students. He attended and completed the Climate Reality Canada Leaders' Training, presented by Al Gore. Bob Adamson has been the recipient of the Bioscience Educator of the Year Award, the Lieutenant Governor's Greenwing Conservation Award, the Prime Minister's Award for Teacher Excellence and the Manitoba Association of School Boards President's Award.

Laren Bill

Laren Bill (Winnipeg) is a member of the Pelican Lake First Nation in central Saskatchewan. He worked with the Treaty Land Entitlement Committee as an Implementation Advisor to First Nations in Manitoba for seven years. He has been the chairperson of the Implementation Monitoring Committee for Treaty Land Entitlement in Manitoba for the past seven years. He holds a Master's degree in Natural Resources Management with a focus on Traditional Land Use and Occupancy Studies from the University of Manitoba through the Natural Resources Institute.

Daryl Domitruk

Daryl Domitruk (Darlingford) is the executive director of Manitoba Pulse & Soybean Growers. He is a registered agrologist and serves on the provincial council of Agrologists Manitoba. Daryl's career spans over 30 years in the crop protection industry, farmer-led research organizations and Manitoba's public service. As a public servant, Daryl delivered farmer-focused programs in resource conservation and crop production, and directed research, renewable energy and science policy programs. He led the Pulse & Soybean Growers' research program prior to assuming overall leadership of the organization. Daryl Domitruk earned a Bachelor of Science in Agriculture and a Master of Science from the University of Manitoba, and a PhD in Crop Science from the University of Saskatchewan.

Karla Guyn

Karla Guyn (Lockport) is the former CEO of Ducks Unlimited Canada, having retired in the fall of 2021. Prior to assuming the role of CEO, she held several senior leadership positions with Ducks Unlimited Canada over her 24-year career with the organization. This included serving as the national director of conservation (2013 to 2016) and director of conservation planning (2006- to 2013). She is recognized as a North American conservation leader, serving on international committees including the North American Waterfowl Management Plan and the Sustainable Forestry Initiative. Karla Guyn holds a Master of Science and a PhD from the University of Saskatchewan.

Tanis Ostermann

Tanis Ostermann (St. Andrews) is the owner and principal of CanSustain, a sustainability and environmental management consultancy firm, based in Winnipeg. She is an Environmental Professional, certified through the Canadian Environmental Certification Approvals Board and is a trained Environmental Management Systems Lead Auditor. She currently serves as a member to the federal Sustainable Development Advisory Council and is a board trustee for FortWhyte Alive. Tanis Ostermann has a Bachelor of Science in Environmental Toxicology, and a Master of Environment from the University of Manitoba.

Roger Rempel

Roger Rempel (Winnipeg) is a climate change technical service lead at Dillon Consulting. From 2017 to 2020, he served as the director of the Climate Group for Risk Sciences International. Roger is an environmental engineer with over 30 years of experience in environmental assessment, climate change vulnerability assessment, industrial risk assessment, environmental systems modeling and stakeholder engagement. Roger Rempel oversees the delivery of climate risk analytical and advisory services, including the development of climate analytics for engineering applications; forensic investigations of severe weather and climate-related infrastructure failures; climate change and human health; and climate change and essential services. He is a past-president of the Association of Consulting Engineering Companies Manitoba and is a certified Infrastructure Resiliency Professional (IRP).

Dimple Roy

Dimple Roy (Winnipeg) is a director with the International Institute for Sustainable Development, where she has worked in various capacities since 2008. Dimple Roy provides research leadership, policy analyses and management functions on issues related to sustainable development in the context of people, land, water and agriculture in Canada and globally. She was also a policy analyst for the former department of Manitoba Conservation (2005 to 2006). She holds a Master of Environmental Design from the University of Calgary.

Laurie Streich

Laurie Streich (Winnipeg) retired from government in 2015. She served in many environment-related positions during her career, including her role as director of the pollution prevention branch of the former department of Manitoba Conservation. Laurie Streich has been a member of the Clean Environment Commission since 2016.

Appendix D – Expert Guest Speakers, Panelists, and other Stakeholder Input

The EAC met with the following organizations/individuals and thank them for their time and effort:

- International Institute for Sustainable Development
- Efficiency Manitoba
- Manitoba's Climate Action Team
- David Rourke, Rourke Farms
- Secretariat to the Economic Development Board
- Dr. Nazim Cicek
- Dr. Mario Tenuta
- City of Winnipeg
- Winnipeg Transit
- City of Selkirk
- Eco-West Canada
- Manitoba Pork
- Manitoba Beef Producers
- Pulse Canada
- Manitoba Canola Growers
- Manitoba Agriculture

We also thank the following organizations and government departments for their written submissions:

- Green Action Centre
- Keystone Agricultural Producers
- Manitoba Agriculture
- Manitoba Economic Development, Investment and Trade
- Manitoba Justice
- Manitoba Municipal Relations
- Manitoba Finance
- Manitoba Natural Resources and Northern Development
- Manitoba Education and Early Childhood Learning
- Manitoba Public Service Commission

And additional organizations that responded to our survey.

Appendix E – Technical Memorandum on setting the second Carbon Savings Account

To: Expert Advisory Council
From: Dave Sawyer, EnviroEconomics
Date: November 28, 2022

1. The approach to calculating the CSA

The approach to setting CSA2 follows the same approach used to set the CSA1, where the CSA is calculated as the sum of emissions under the “business-as-usual” (BAU) projection for the five year CSA period minus the sum of the emissions under a “with additional policies” (WiAP) scenario over the same period. Formally, the CSA is expressed as,

$$CSA\ 2 = \sum_{2023-2027} BAU - \sum_{2023-2027} WiAP \quad (\text{Equation 1})$$

Where,

CSA2 is the Carbon Savings Account for 2023 to 2027,

BAU is sum of emissions under the “business-as-usual” projection for CSA2 (2023 to 2027).

WiAP is the sum of emissions “with additional policies” projection for CSA2 (2023 to 2027).

Each term is discussed below.

Figure 1: How to calculate the Carbon Savings Account

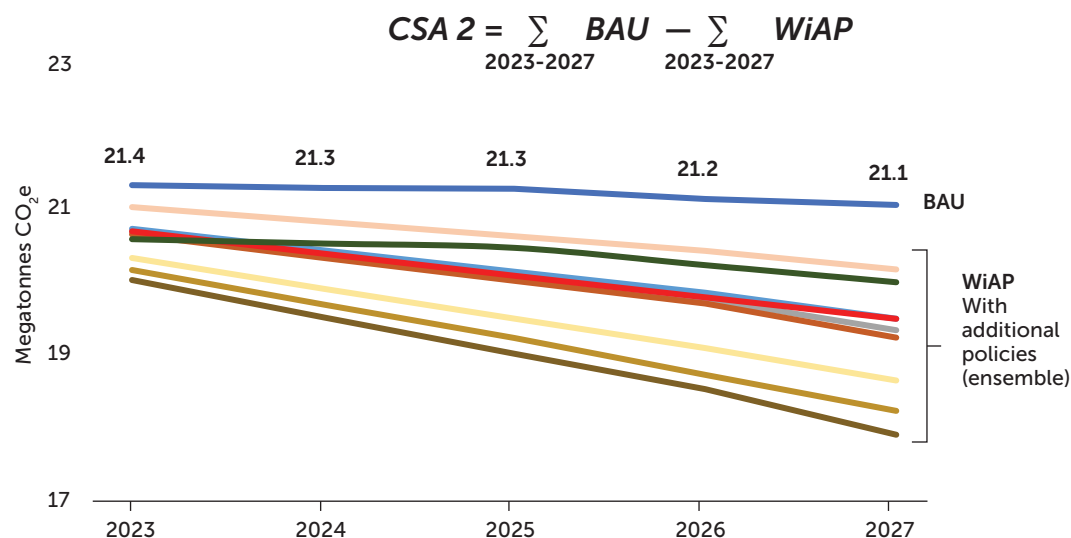


Figure Note: The cumulative “business-as-usual” emissions between 2023 and 2027 are calculated and then the cumulative emissions from the “with additional policies” projection are subtracted. In this example, cumulative BAU emissions are 106.25 megatonnes while cumulative WiAP projection emissions are 100.7 megatonnes. The CSA2 in this example would be 5.6 megatonnes. A range of WiAP scenarios, as illustrated in the chart, are used to inform the range of possible CSA2 values that accounts for differences in models, modeling assumptions, and policies modelled.

1.1 The business-as-usual projection

Sum the total of expected emissions for the CSA2 period under a “business-as-usual” (BAU) projection. A modelled BAU emissions projection is used to estimate Manitoba’s total emissions for the five-year CSA2 period (2023 to 2027). The BAU emissions projection for CSA2 reflects expectations

about Manitoba's future emissions based on legislated and currently implemented federal and provincial policy. It is a standard convention to only include in the BAU those policies that have been implemented, as in the case of Environment and Climate Change Canada's "with measures scenario". Practically this means the federal carbon price currently legislated at \$50 in 2022 does not rise after 2022 in the BAU projection since the proposed federal price increase to \$170 per tonne has yet to be legislated.

Consistent with CSA1, the BAU projection is adopted from the latest Environment and Climate Change Canada (ECCC) projection for Manitoba, the 2022 Reference Case Projection. This case includes actions taken by governments, consumers, and businesses up to September 2022. It does not account for all measures included in Canada's Emissions Reduction Plan as some many policies are still under development. For example, in the ECCC "with measures" projection, the carbon price is held flat at \$50 after 2022 since the carbon price increase to in \$170 in 2030 has not yet been legislated. Included are existing Manitoba policies such as the Manitoba Building Code Section 9.36 (for housing) and the Efficiency Manitoba Act.

The cumulative BAU emissions across the five-year CSA2 period under the BAU projection estimated by ECCC are 106.25 megatonnes (Figure 2).

Figure 2: CSA2 BAU Emissions

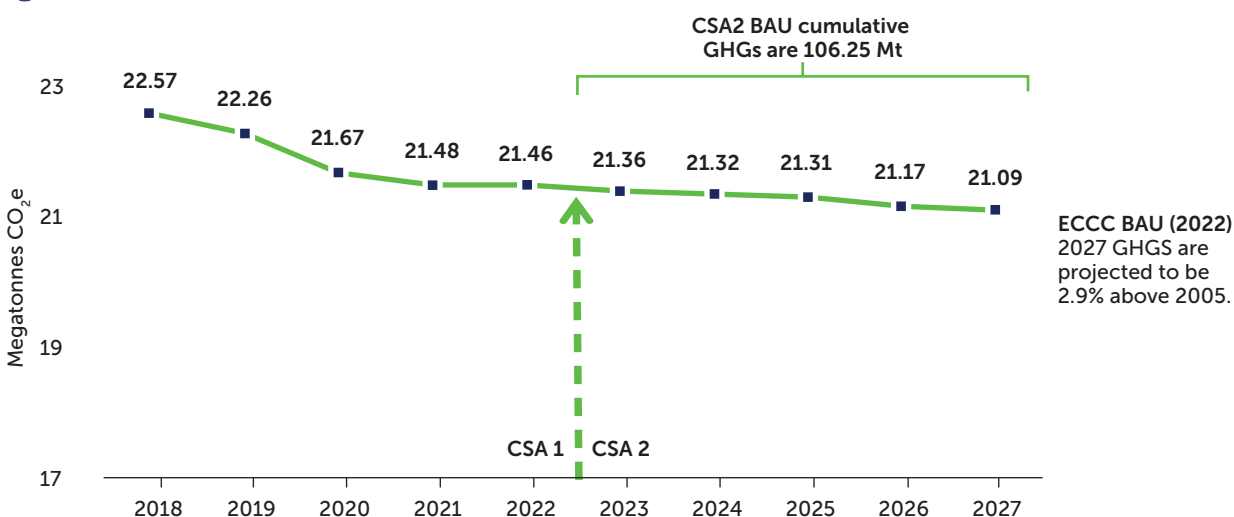


Figure Note: The BAU is taken from ECCC's latest reference case for Manitoba, accounting for existing federal and provincial policy implemented before September 2022.

1.2 The with additional policies projections

Sum the expected emission under a "with additional policies" (WiAP) projection. New and additional policies are added to the BAU that bend emissions down below the BAU, providing an estimate of the incremental impact of modelled policies. In the case of the federal carbon price applied in Manitoba, for example, the proposed \$15 (nominal) per year price increase would be modelled as \$65 in 2023 rising to \$125 in 2027 and eventually hitting \$170 in 2030.

To inform the WiAP, and address uncertainty across any single model or set of policy assumptions, several modeling projections are used to bound a range of CSA2 emission pathways to develop an ensemble view of the reductions possible under new climate policy.

Technical advice was sought from EnviroEconomics to aid in identifying the WiAP projections, and to support the Expert Advisory Council in developing the recommended CSA2. Four main sources of WiAP projections inform the possible range of WiAP considered by the Expert Advisory Committee, presented in Figure 3 below:

1. Navius Research and Dunskey Energy + Climate Advisors modeled a wide range of emissions pathways and policies to 2030 and net-zero. A total of six Dunskey Energy + Climate Advisors net-zero runs were reviewed while 14 Navius Research runs were consulted. Two representative scenarios are provided in Figure 3 labeled Dunskey -60% below 2005 in 2050 and a Navius carbon price trajectory of \$170 by 2030.
2. Environment and Climate Change Canada's modelling of their [Emissions Reduction Plan published in March 2022](#) reflects a wide range of legislated policy, but also proposed policy that is under development (ECCC ERP in the figure).
3. Modeling completed by Navius Research for the Canadian Climate Institute assessing [Canada's Net-Zero Future](#) includes 62 scenarios. From these, low, median, and high projections were developed based for Manitoba, labeled NZ lower, NZ median, and NZ higher in the Figure.
4. The Canadian Climate Institute conducted an independent review of the [Federal Emissions Reduction Plan](#). Three scenarios were modeled by Navius Research corresponding with three levels of policy stringency reflecting increasing uncertainty in policy design and implementation. These are labeled ER-low, median, and high ambition in the Figure.

Cumulative emissions range between 96.3 megatonnes and 103.3 megatonnes for nine WiAP projections.

Figure 3: The BAU and WiAP projections

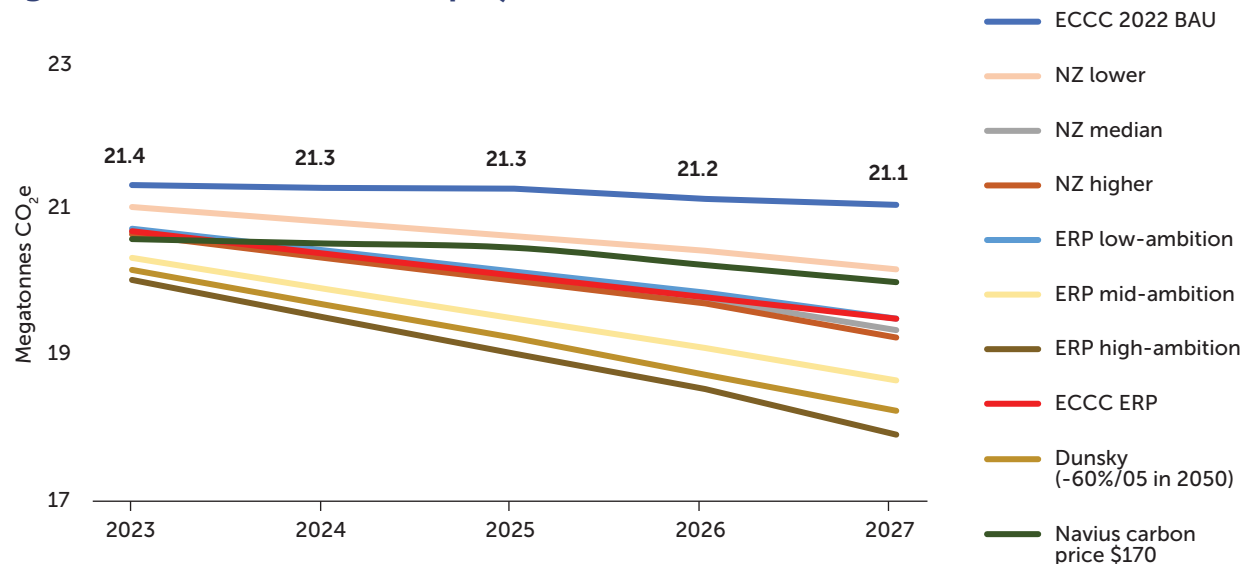


Figure Note: A total of nine WiAP projections were used to identify the range of possible emissions outcomes to inform CSA2. These WiAP projections are a limited set of the total possible WiAP projections that were reviewed and consulted. For example, the NZ lower, median, and higher projections reflect 62 net-zero scenarios modelled for the Canadian Climate Institute.

The various WiAP projections would place Manitoba on a trajectory that ranges between 1.4 and 12% below 2005 emissions by 2027, the last year of CSA2 (Figure 4). The fact that some of the more stringent policy packages like the ERP high-ambition scenario only places Manitoba on a trajectory to hit a 12% reduction below 2005 levels indicates that:

- Emission reductions in easy to abate sectors such as electricity has already occurred prior to CSA2;
- Additional emission reduction opportunities are more complex and are likely to be highly dependant on external factors such as commercial availability of technologies; and
- Significant emissions reductions in CSA2 beyond those presented would be characterized as high-cost and technologically challenging to implement.

This high-ambition run reflects a series of policies that would place Canada on a trajectory to hit at least 40% below 2005 emissions in 2030.

Figure 4: WiAP emissions in 2027 relative to 2005

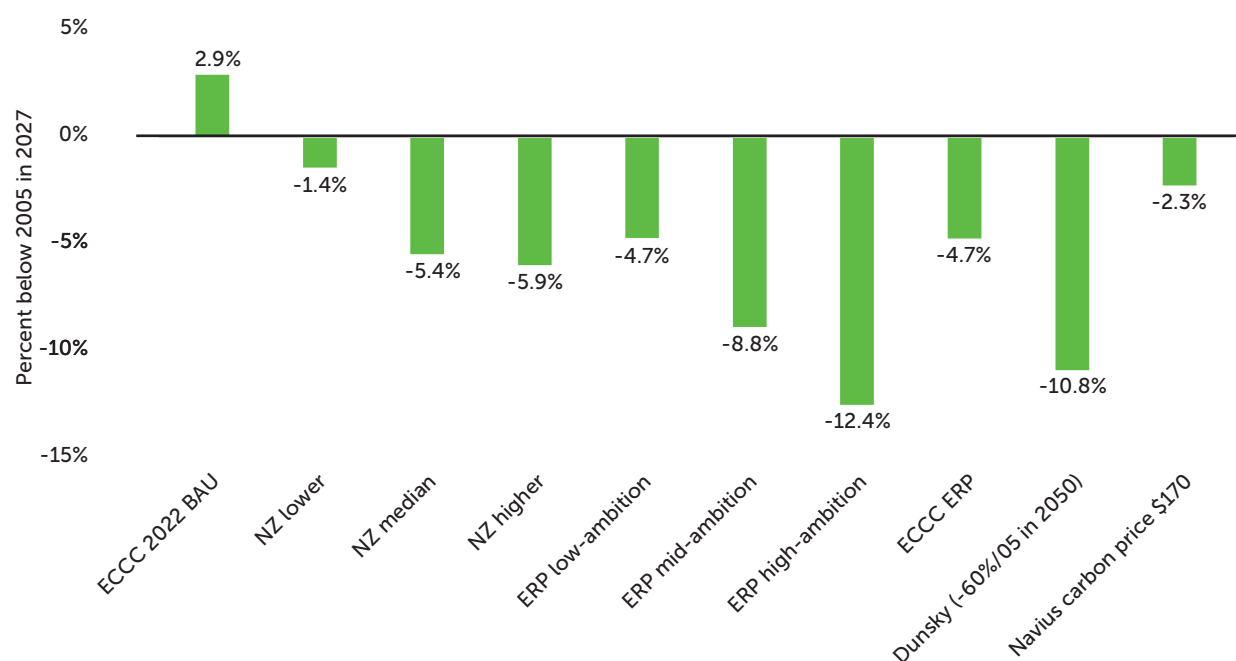


Figure Note: The ECCC BAU projection places Manitoba on a trajectory to have emissions be 2.9% above 2005 levels in 2027. The WiAP scenarios show a range of minus 1.4% to minus 12% below 2005 levels. Relative to other jurisdictions in Canada, Manitoba has relatively high-cost emission reductions opportunities associated with decarbonizing transportation and buildings, which are known to be some of the most expensive reductions possible.

2. The CSA2 range

Equation 1 is used to calculate the range for CSA2 in Figure 3. Based on a review of the various WiAP projections, a range of 5.6 to 8 Mt cumulative emissions reduction is suggested. For the last year of the CSA2, 2027, this range corresponds to a 4 to 9 percent reduction below 2005 emissions.

To achieve the 5.6 Mt cumulative reduction, a series of federal policies will need to be implemented such as the \$170 carbon price, the Clean Fuel Regulations, improved vehicle efficiency standards, EV sales mandates, and significant carbon financing. Manitoba will need to supplement these policies to bolster federal efforts.

The 8 Mt cumulative emission reduction is a stretch target reflecting increased policy ambition, with a need for the federal ERP to be fully implemented as announced, and to have Manitoba top up emission reductions in key areas including buildings, transport, and industry. The federal ERP policies include:

- Capped emissions from the oil and gas sector
- 75% reduction in oil and gas methane emissions
- Clean Electricity Standard for 2035
- Waste methane capture
- Medium- and Heavy-duty Emissions Standard
- National Net-zero Emissions Building Strategy
- Investment tax credit for carbon capture utilization and storage
- Canada Infrastructure Bank Spending
- Large Truck Retrofits
- Replace home-heating oil

Figure 5: The CSA2

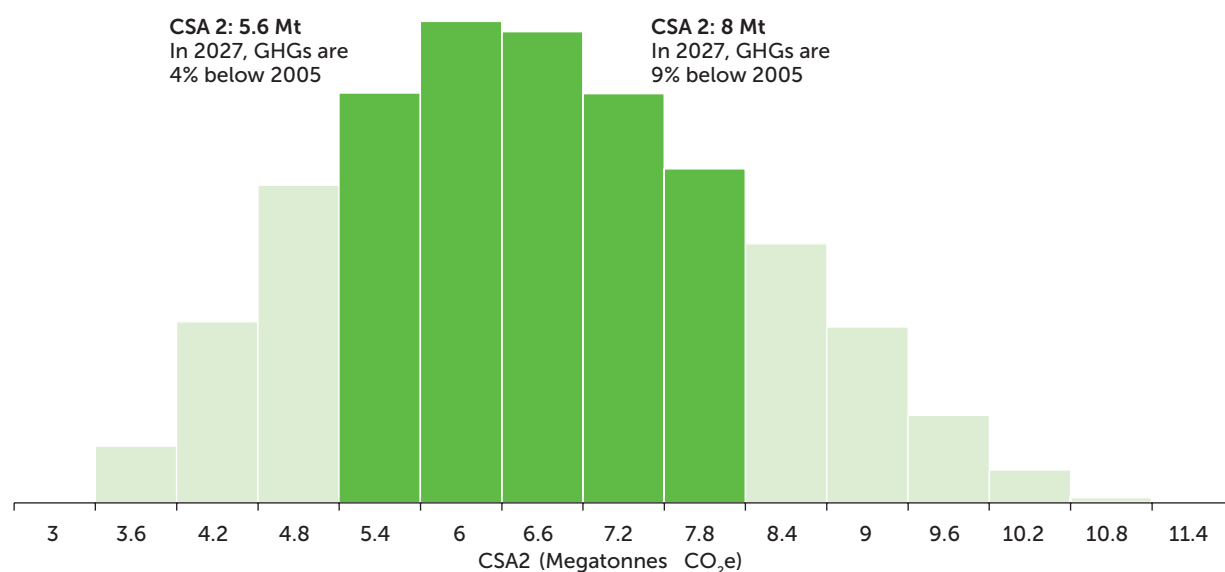


Figure Note: Using equation 1 results in a CSA2 that ranges between 3 and 11 megatonnes. In terms of policy feasibility, the 5.6 megatonnes is identified as a reasonable target for Manitoba. With additional effort it is possible to top up the level to 8 megatonnes. Achieving this level of the CSA will require significant policy effort by both Manitoba and will rely on the federal government implementing all its measures contained in its Emissions Reduction Plan.

3. The road to net-zero

Modeling and analysis of net-zero pathways for Manitoba indicate that the heavy lifting in terms of emissions reductions happens in the 2030 to 2035 period (Figure 6). It is at this point that the models indicate a wide range of emissions reducing technologies will be commercially available to significantly bend down the emissions trajectory. Modelling by Navius Research for the [Canadian Climate Institute](#) indicates that safe bet technologies that are already commercial, including heat pumps and electric vehicles, will become widely deployed displacing fossil fuel alternatives. At the same time, wildcard technologies including renewable natural gas, hydrogen, and advance biofuels will start to become commercially available thereby transforming Manitoba's emission pathways.

A policy package that pushes for more emission reductions prior to 2030, and more line with CSA2 in the order of 8 Mt would help prepare Manitoba to align its technology and emissions trajectory closer to the net-zero pathway where major reductions and technology deployment happen after 2030.

Figure 6: Manitoba's net-zero pathway

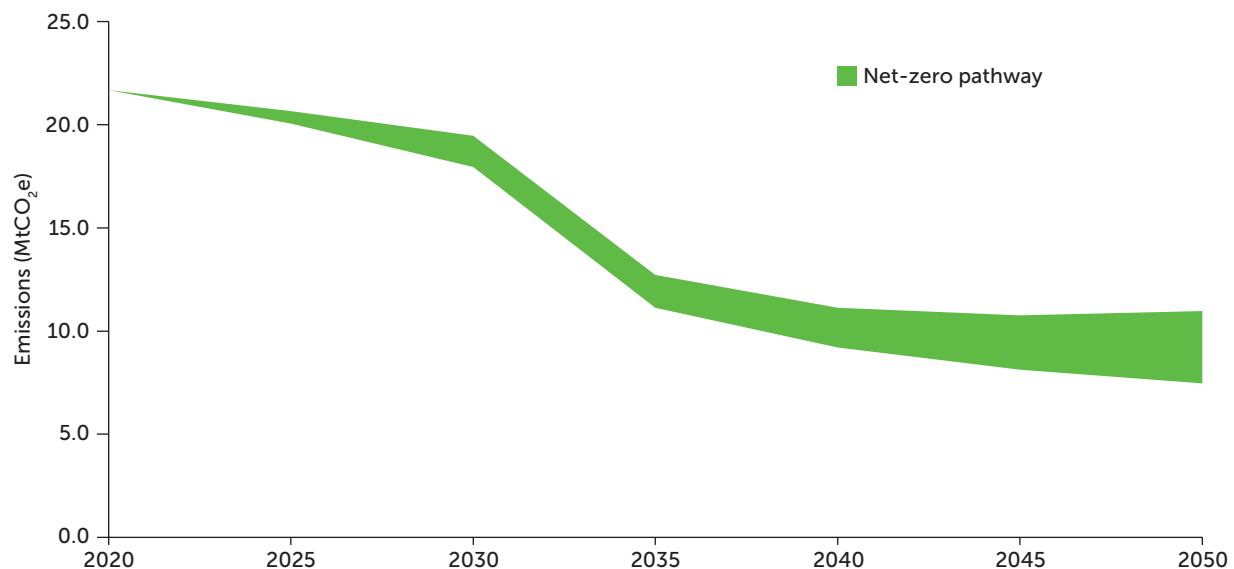


Figure Note: Modeling by the Canadian Climate Institute conducted by Navius Research indicates that Manitoba's net-zero pathway becomes particularly steep after 2030 due to the availability of lower cost technologies and low emitting fuels such as heat pumps, electric vehicles, renewable natural gas, and next generation biofuels.