



A Made-in-Manitoba Climate and Green Plan

Hearing from Manitobans

Manitoba
Sustainable
Development

2017



Manitoba 

Table of Contents

| | | | |
|--|-----------|--|-----------|
| A Made-in-Manitoba Plan | 1 | Water | 35 |
| | | <i>Wetlands and Watersheds.....</i> | <i>35</i> |
| The Strategic Framework | 2 | <i>Agriculture and Land Use</i> | <i>37</i> |
| | | <i>Flood and Drought.....</i> | <i>37</i> |
| Strong Foundations | 4 | <i>Water Quality</i> | <i>38</i> |
| Knowledge and Foresight | 4 | Nature | 41 |
| Planning and Adapting | 5 | <i>Parks and Protected Areas.....</i> | <i>41</i> |
| Education and Awareness | 5 | <i>Wild Species and Habitat.....</i> | <i>43</i> |
| Local and Indigenous Knowledge | 6 | <i>Forests and Natural Areas</i> | <i>44</i> |
| | | <i>Conservation</i> | <i>45</i> |
| The Four Pillars..... | 8 | Implementation | 48 |
| Climate..... | 8 | Expert Advisory Commission | 48 |
| Jobs..... | 8 | Carbon Savings Account | 48 |
| Water | 9 | Sectors and Communities | 50 |
| Nature | 9 | Measuring Results | 50 |
| The Keystones | 10 | Projected Emissions Reductions..... | 55 |
| Climate..... | 10 | | |
| <i>Clean Energy</i> | <i>10</i> | Moving Forward | 56 |
| <i>Carbon Pricing.....</i> | <i>13</i> | | |
| <i>Sector Emissions Reductions</i> | <i>19</i> | | |
| <i>Adaptation</i> | <i>26</i> | | |
| Jobs..... | 29 | | |
| <i>Innovation and Cleantech.....</i> | <i>29</i> | | |
| <i>Financing and Investment</i> | <i>31</i> | | |
| <i>Skills and Training</i> | <i>31</i> | | |
| <i>Green Infrastructure.....</i> | <i>33</i> | | |

A Made-In-Manitoba Plan



As Premier of Manitoba I am pleased to provide Manitobans with the opportunity to help shape our province's climate and green plan for the next decade.

Manitoba has always punched above its weight as a clean, green province. From hydroelectricity to protecting forest and wetlands, we understand the unbreakable connection between nature and community, and the environment and the economy.

It's time to do even more.

We are proposing a Made-in-Manitoba climate and green plan framework for your feedback and input.

Climate change is real and is already impacting us. It is being accelerated by carbon and greenhouse gas emissions from humans. Scientists all over the world agree climate change is happening and poses a growing threat to how we live and work.

Severe storms and unpredictable weather are occurring with greater frequency. Flooding, fires and drought can cause economic and social hardship and impacts on families and communities. Wildfires and pests affect our croplands, grasslands and forests. Insurance impacts and costs are rising due to increased flooding and fires. Communities, businesses and governments face higher disaster management costs as a result.

Farmers growing our food are on the front lines of climate change in Manitoba. Changes in weather, water and heat affect what they plant and how they harvest.

But there is hope. Working together, we can become more resilient at both the provincial and local levels in the face of climate change. We can gain jobs and economic opportunities by making smart investments in clean technology and green jobs. And we can reduce carbon pollution causing climate change.

Climate change and sustainable development are part of the same opportunity for Manitoba. We need to view

them together. There are real co-benefits to both our environment and economy of having an integrated climate and green plan.

Protecting wetlands and watersheds, for example, helps wildlife and sustains habitat. But it also enhances our water retention capacity in the face of climate-induced flooding. Green infrastructure investment creates jobs but also makes us more resilient against climate change. It enhances quality of life for Manitobans by protecting the environmental resources upon which we depend.

We believe in the principle of sustainable development, which looks at human development in a way that acknowledges the

VISION
Manitoba will be Canada's cleanest, greenest and most climate resilient province.

importance of and need to balance environment,

economic and social objectives. It is the idea that we should strive to meet the needs of the present without compromising the ability of future generations to meet their own needs. Our whole strategic approach will be built on this principle — to lead and innovate in sustainable development.

That is why we renamed the department responsible for the environment and natural resource management to Manitoba Sustainable Development. Our proposed climate and green plan flows from that key principle.

We have a bold new vision for a clean, green Manitoba. Here it is:

Manitoba will be Canada's cleanest, greenest and most climate resilient province.

It is a vision based on the strong foundations already put in place by Manitobans.

It is a vision we can achieve with this strategic framework we are proposing to Manitobans.

Give us your views, ideas and suggestions. We want to hear from you.

Original signed by
Premier Brian Pallister

The Strategic Framework

Explaining the Strategic Framework

The proposed strategic framework provides both scope and direction to Manitoba's Climate and Green Plan. At a glance, it conveys a broad sense of the strategic objectives of the plan. It possesses five key attributes.

First, it is comprehensive.

The framework covers the full range of sustainable development approaches and activities from climate to jobs to water and nature.

Second, it is integrated.

It brings together the environment and the economy through the strategic approach of sustainable development leadership and innovation.

Third, it is focused.

It stays focused on the top priorities and needs of Manitobans through the pillars and keystones rather than a scattered list of item after item.

Fourth, it is dynamic.

It sets out short, medium and longer-term actions allowing for even more measures to be undertaken within the strategic framework, as needs arise and resources permit.

Fifth, it is practical.

It sets out clear and realistic ways to be implemented at the outset, ensuring we can make real progress towards the vision and goals it sets out.

The strategic framework is grounded on strong foundations. These are set out to make clear the knowledge and evidence-based approach we propose. And it explicitly involves Manitobans by taking a longer-term view of how thinking and acting sustainably can improve our lives and livelihood.

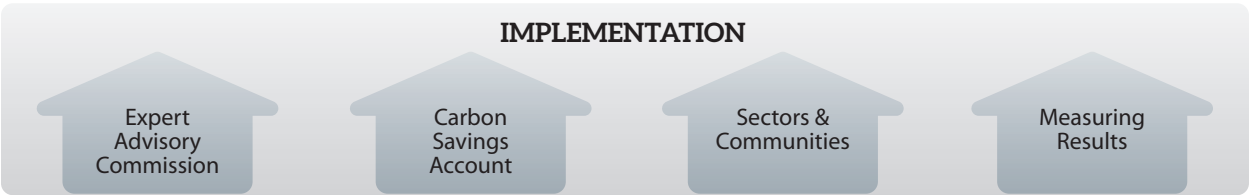
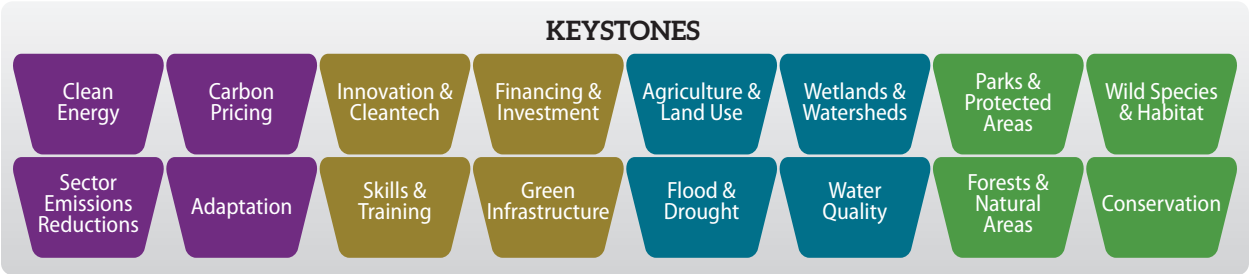
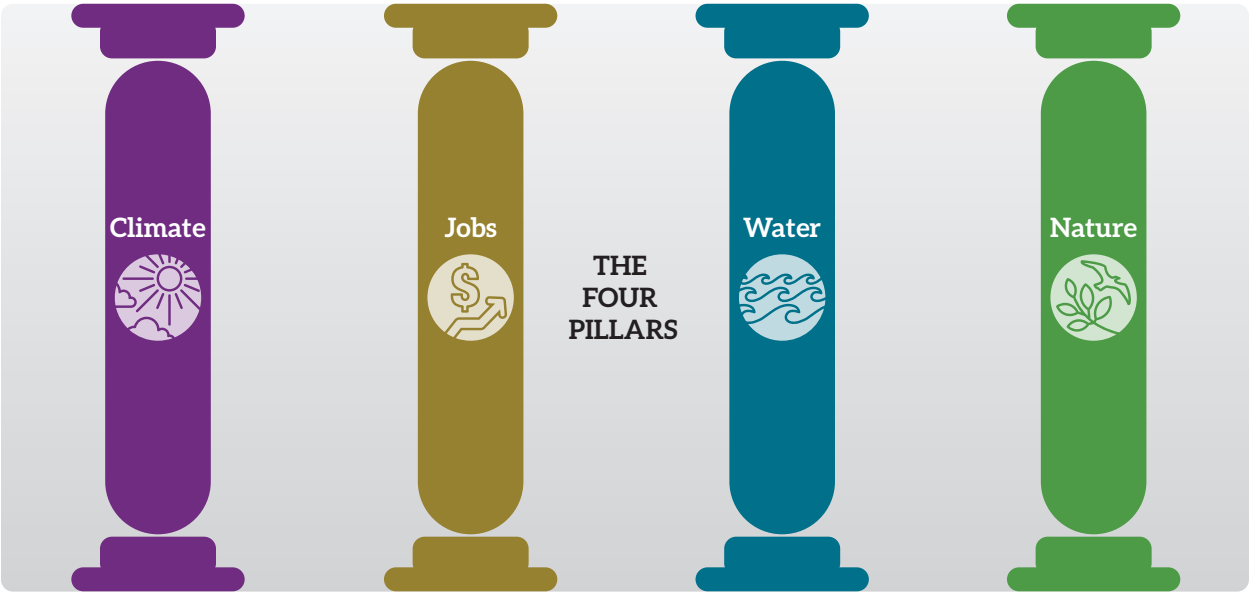
The next section explains the foundations in more detail.

Questions for Discussion

- What are your views on the key elements of the strategic framework?

VISION
Manitoba will be Canada's cleanest,
greenest and most climate resilient province.

STRATEGIC APPROACH
Lead and innovate in sustainable development.



Strong Foundations

FOUNDATIONS

Knowledge and Foresight

Planning and Adaptations

Education and Awareness

Local and Indigenous Knowledge

The initiatives outlined in this plan are proposed as measures to move us toward a more prosperous and sustainable future. But, our success will depend not only on the actions we take but on the foundations upon which we build.

Our vision is that of a clean, green and climate resilient province. We will achieve this vision by:

- understanding the changes affecting our environment and economy
- planning for and adapting to those changes
- working together on solutions
- making sure we follow through on our commitments

Knowledge and Foresight

The world is changing, in ways that are both hopeful and concerning. How we respond to these changes is important and the more we understand them, the better able we'll be to navigate them. This requires being at the forefront of knowledge about the phenomenon of climate change and what it will mean to our province. It means having the foresight to look beyond the next few years and make decisions that put us in good stead for decades to come. It also means understanding better how protecting the environment can lead to more sustainable prosperity. Ecological goods and services provide a practical linkage between the environment and economy.

One of the more concerning changes we face today is climate change. Climate change refers to long-term changes in global temperatures and patterns of precipitation, as well as the consequences that follow. Climate change is nothing new. Indeed, thousands of years ago Manitoba was covered by thick sheets of ice. At other times it's been flooded by deep and expansive inland lakes. But unlike the past, where changes occurred slowly over very long periods of time, today's climate is changing rapidly, primarily due to

the unprecedented emission of industrial, agricultural and energy-based greenhouse gases (GHGs) into the atmosphere.

What is the Greenhouse Effect?



The burning of fossil fuels like gas, oil and coal creates carbon dioxide, a greenhouse gas (GHG) that acts like an atmospheric blanket to trap and hold the sun's heat close to the earth. But as we increase our use of fossil fuels, we increase the levels of GHGs in the atmosphere, thereby thickening the blanket and trapping in more heat. This results in higher average global temperatures, which in turn cause melting glaciers and ice caps, rising sea levels, changes in precipitation and weather pattern, and potentially dangerous impacts on both people and the planet. A projected temperature outlook produced at the University of Winnipeg indicates the Canadian prairies annual temperature could increase by five to 10 degrees Celsius by 2090.

When the climate changes rapidly, it can have both gradual and rapid impacts on people, places and prosperity.

What are some of the changes we might expect? Current scientific models suggest that Manitoba may experience increasingly warmer overall conditions, hotter summers, changes in precipitation, unpredictability of weather, and increased frequency of extreme events such as storms, floods and forest fires. Climate change can alter habitats and local wildlife populations, pose challenges to agricultural production, impact livelihood activities, and damage infrastructure, affect human health and threaten our economy.

The Manitoba government acknowledges the seriousness of this issue and what it might mean for our province. Through science and applied research, we are committed to giving communities and key sectors the information and tools needed to help them plan and adapt in response to a changing climate.

Planning and Adapting

Manitobans know the value of planning. More than most, we understand the power of floods, fires and storms. Through bitter experience we have seen what can happen if we are unprepared for such events.

We must support actions to help slow the rate of climate change, strengthen our ability to adapt to the changes that may come, and build a province that is both prepared and resilient in the face of climate change risk.

A **climate-resilient** society is one that is able to withstand, respond and recover quickly from the impacts of a changing climate.

This means sharing more widely what the science is telling us about climate change as well as other environmental impacts due to development or neglect.

It also means creating new planning tools for communities and others to help them make durable decisions based on sustainable development principles. For example, factoring extreme and unpredictable weather events into infrastructure and watershed planning is sound risk management. So is thinking of innovative ways to grow our crops and manage our businesses to adapt to changes in climate.

Being prepared — and therefore more resilient — is really what planning and adapting is all about.

Education and Awareness



Manitobans can do more when they know more. Education and awareness are key to making more informed choices about sustainability, as a province, community, or as individuals.

Whether it is recycling waste or being more energy efficient, each of us can help make a difference. And each of those contributions add up.

Part of making change happen is to ensure that everyone is aware and educated on what's at stake and how each of us can help. Climate change, while affecting us now, will impact our children and grandchildren much more. Schools, colleges and universities can play significant roles in creating the momentum for change.

We need to be mindful that not all Manitobans will be affected by climate change in the same way. Some people may find it easier to adapt and prosper. Others may have a more difficult time with changes. Manitoba's Indigenous peoples, for example, may be disproportionately impacted by climate change, particularly in northern regions, where more rapid warming has already begun to impact lake ice and permafrost, winter roads and infrastructure, and changes to ecosystems and wildlife habitat. Similarly, depending on their region and economic situation, certain agricultural producers, economic sectors, businesses, communities and families may find it more difficult to adjust to sudden changes.

We will succeed in achieving our vision through greater education, training and awareness. By sharing our perspectives and experiences, we can strengthen our common purpose and find viable solutions.

Local and Indigenous Knowledge

Manitobans' personal experiences are a key foundation upon which actions on climate change and sustainability can be built. Long exposure to the natural forces of weather and nature gives us a rich understanding of its strength and what can be done to adapt and prosper.

Indigenous peoples hold true to a seven-generation philosophy of living at one with their surroundings. Traditional knowledge passed on from generation to generation can be a powerful foundation upon which to build the next generation of sustainable development actions.

Farmers also have extensive experience and knowledge of the land and climate. They are often among the first to feel the sudden negative impacts of a changing climate and extreme weather events. These impacts may threaten the security and profitability of these family enterprises in a direct and profound way. Bringing their knowledge to the forefront to help address climate change, water and land use is smart and useful.

What is one tonne of CO₂?

One tonne of CO₂ is emitted every time someone:

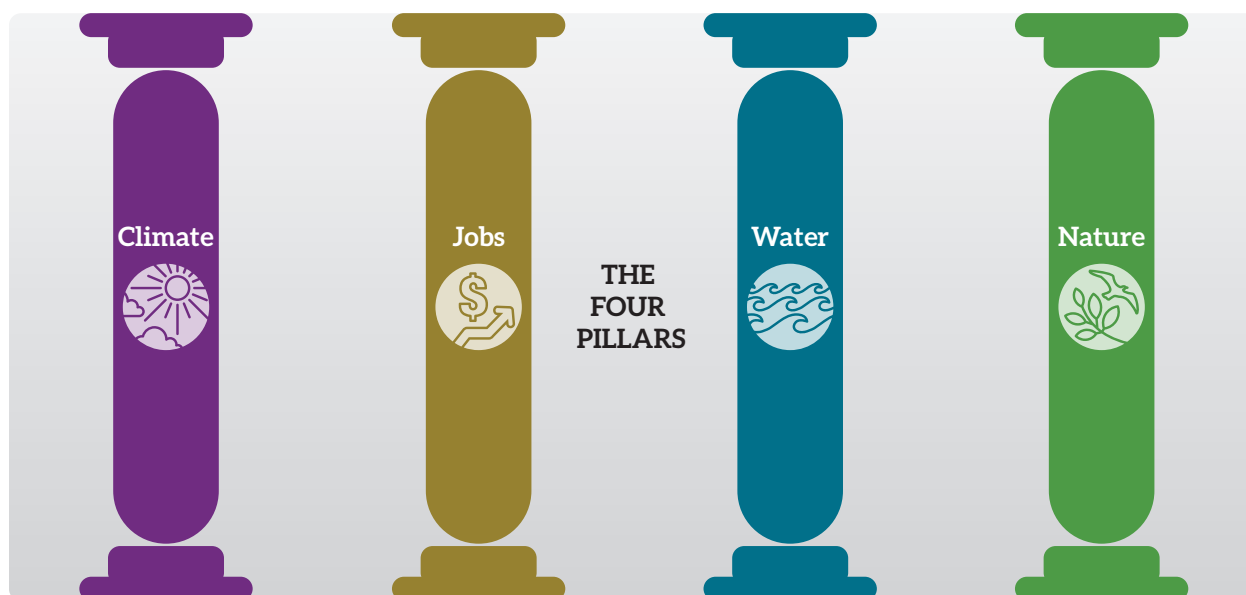
- drives 4,500 kilometres
- heats a home for three months

Physically manifested, one tonne of CO₂ emissions would be eight cubic metres in size.

Questions for Discussion

- Are these the right foundations?
- How can we strengthen these foundations to our collective benefit?

The Four Pillars



The proposed Manitoba Climate and Green Plan sets out four main pillars as its integrated focus. Each pillar has four keystones that reflect and guide the individual actions for that pillar. Together, the four keystones make up the main areas of activity for each pillar. New actions can be added to each keystone to keep the whole plan dynamic and forward looking.

Climate Change refers to any changes in climate over time, whether as a result of natural phenomena or human activity.



Climate

The climate pillar's mission is to reduce GHG emissions, invest in clean energy and ensure Manitoba adapts to climate change impacts. It contains carbon pricing as a principal tool to help reduce emissions. Success in tackling climate change means using free-market forces and smart regulation together to make meaningful, step-by-step emissions reductions that fit Manitoba's energy, economy and emissions profile. It is about doing our part, realistically and effectively, as Canada and the world further transition to a low-carbon economic future.

More carbon dioxide in the atmosphere is projected to lead to more instances of intense storms and flooding, eroding shorelines, extreme heat and droughts, and destructive wildfires in Manitoba. These extreme weather events from a changing climate impose real costs on Manitobans.



Jobs

Sustainable development brings the environment and economy together. It means jobs and economic opportunity for Manitobans, as well as the need to protect and preserve our natural environment and live and act sustainably. Having a jobs pillar shows a core focus on using sustainable development to help create new jobs and economic growth for Manitobans. This includes green infrastructure investment, as well as investing in all aspects of clean technologies and innovations that create new jobs in a new economy. Small and medium-sized businesses can benefit from the best financing and investment tools they need to start up and grow. Education and training can assist individuals, businesses, industry sectors and communities to develop the knowledge and skills needed to seize new opportunities in a clean, green economy.



Water

Water is the essence of life. The water pillar brings together challenges of water quality and water quantity. It recognizes the important relationship between land use and water quantity and recognizes that management must happen locally and regionally on a watershed basis. It addresses the twin perennial issues of flood and drought that have plagued Manitoba over the years.

Wetlands and well-managed watersheds are critical to preserving habitat and wildlife. They can also act as natural drainage features in a time of climate change and flooding. This pillar brings all key aspects of water management together in a concerted mission to find integrated solutions that work.

Agriculture is a mainstay of Manitoba's economy. Addressing land and water use together can help harness natural opportunities for managing irrigation, prospering through climate change, sequestering carbon on agricultural land, and increasing yields.

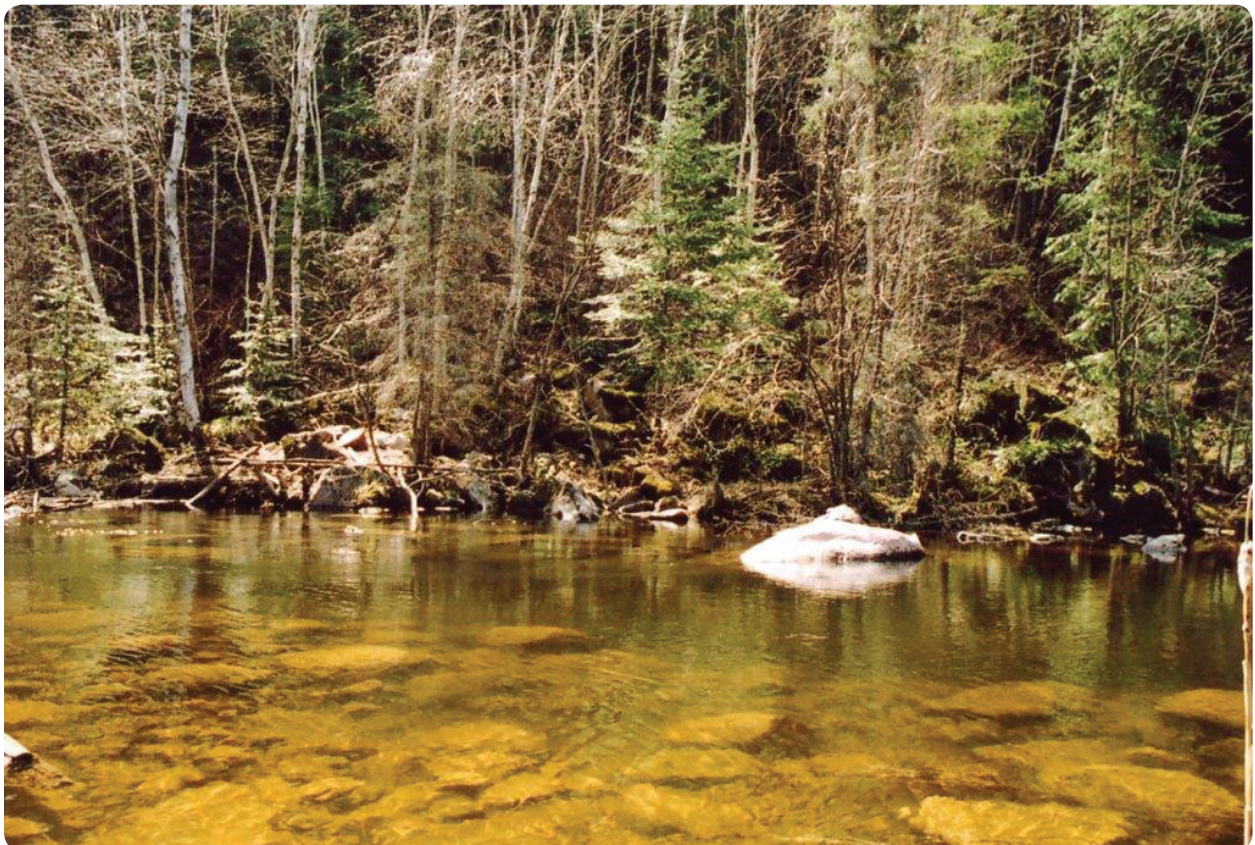


Nature

Respecting nature in all its majesty and vulnerability is the mission of the nature pillar. It begins with upholding and enhancing our beautiful provincial parks system, so Manitoban families can enjoy a greater connection with nature and ecotourism. Wild species and habitat fall under this pillar so we can preserve species at risk and foster stronger natural growth of our unique Manitoba wildlife. Manitoba, in partnership with Indigenous communities, is seeking UNESCO designation for parts of its boreal forest as a longer-term means of protection. This is the same boreal forest that can continue to act as a carbon sink for emissions causing climate change. Conservation ensures we actively invest in preserving our natural environment while growing through economic development.

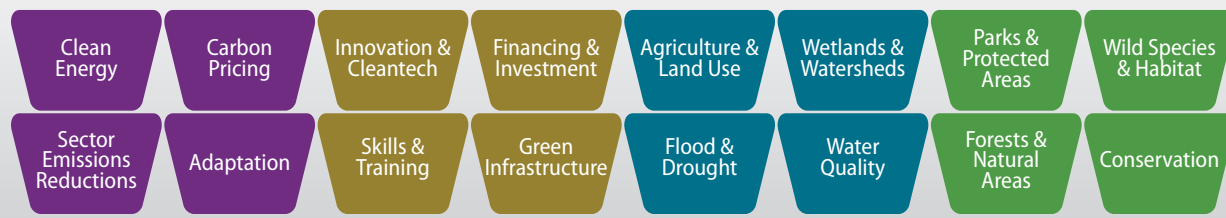
Questions for Discussion

- Are these the right pillars to give focus to the Climate and Green Plan?



The Keystones

KEYSTONES



Each pillar of the Climate and Green Plan is associated with four keystones that identify the priority areas for action. The dynamic nature of the pillars and keystones allows for the addition of activities or initiatives as time, resources, and circumstances permit.

The following sections describe each of the keystones and outline some proposed actions and measures that government and others could take to achieve the goals of the pillar. Your views on these keystones and proposed initiatives are welcome.



Climate

Clean Energy

Cleaner, more efficient energy use can help Manitobans lower their carbon emissions and lead to real cost savings and a healthier environment. By looking for opportunities to build upon our skills and ingenuity, we can generate new jobs for Manitobans and innovative technologies to market around the world.

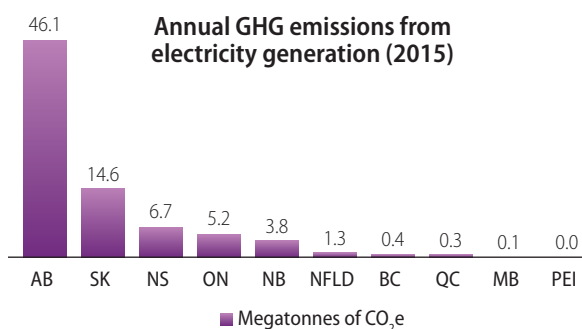
Carbon refers to carbon dioxide or CO₂, the most common greenhouse gas.

CO₂e (or carbon dioxide equivalent) is the common unit used to compare various greenhouse gases based on their global warming potential. Carbon dioxide is used as the reference as it is the most common greenhouse gas in the atmosphere.

The following initiatives are currently being considered to support the Clean Energy keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Manitoba's Clean Energy Advantage

Manitobans have long known the value of investing in clean energy. Since 1906, we have been harnessing clean hydro electricity from our rivers. As a result, Manitoba now has one of the cleanest electricity grids in Canada and the world with over 99 per cent of our electricity generated from clean, renewable sources. Manitoba's long-term commitment to developing its renewable energy sources, rather than relying on imported fossil fuels, has significantly reduced the province's carbon footprint. If Manitoba had chosen instead to rely on thermal generation of electricity, such as coal or natural gas plants, Manitoba's overall carbon emissions would be double current levels – 42 MT per year rather than 21 MT they are today.



This gives us a leg up in the low-carbon economic transition Canada and the world are undergoing. It means clean, low-cost power for business growth. It also means a clean, green marketing advantage in attracting new investment and promoting our Manitoba brand.

There is significant capacity in the province for additional renewable energy. The Keeyask Generating Station, set to go online in 2021, will add 695 megawatts (MW) of capacity to Manitoba's electric grid. That's enough electricity to power 400,000 homes, or roughly twice as many single-family homes as are in Winnipeg today.

Decarbonization through electrification is critical to achieving climate change targets. Manitoba and Canada have benefitted from our early investments in clean energy. We are well positioned to provide reliable, clean energy to other jurisdictions as they too begin to shift away from fossil fuels towards prosperous low-carbon economies.



Manitoba already exports clean energy across the border to Minnesota and Wisconsin, reducing emissions in those states. Exporting our clean energy to our neighbouring province Saskatchewan via a new western electricity grid would reduce fossil fuel energy use in that province and help Canada achieve its overall emissions reduction targets. In January 2016, Manitoba Hydro and SaskPower agreed to a 20-year, 100 MW power sales agreement, which could lead to annual reductions of approximately 200,000 to 400,000 tonnes of carbon dioxide in displaced Saskatchewan electricity emissions. Federal financial support for a new and even larger transmission line could result in annual emissions reductions of about three megatonnes of carbon dioxide in Saskatchewan by using clean Manitoba hydro electricity.

Decarbonization refers to the current trend to shift energy use from fossil or carbon-based fuels to clean energy sources.

Efficiency Manitoba

Manitoba's clean energy advantage puts us solidly on the path to a prosperous, low-carbon economy. But there are also advantages to using our energy resources more wisely and efficiently right now.

Manitoba winters are cold and many Manitobans rely on carbon-emitting natural gas furnaces to stay warm. Annually, Manitoba consumes around 1.6 billion cubic metres of natural gas, which translates to approximately 3,000 kilotonnes of carbon dioxide. Manitoba has introduced legislation to create a new energy-saving demand-side management agency known as Efficiency Manitoba. This new stand-alone agency will help households and businesses reduce their energy consumption and save money on their electricity bills. That means lower energy and Hydro bills and more jobs.

By reducing electricity and natural gas consumption through targeted programming, Efficiency Manitoba will realize legislated targets of an 11.25 per cent reduction in domestic natural gas demand and a 22.5 per cent reduction in domestic electricity demand over a 15-year period. The natural gas savings would translate into GHG emissions reductions of approximately 2,700 kilotonnes over a 15-year period. It will be up and running in 2018.

Demand-side management refers to energy conservation and efficiency activities designed to reduce the demand for energy and electricity as well as using more green heat.

Green Heating

Heat is often the single largest reason we use energy in our society. In Manitoba, building and water heating consumes roughly one third of energy use and represents the majority of emissions attributed to the operation of buildings.



For many households and businesses there are real long-term savings to be gained by switching from fossil fuel heat, such as natural gas or heating oil systems, to green heat options such as geothermal, solar heat and biomass.



Transitioning to green heat can create new markets and new opportunities. These systems generate renewable heat energy, reduce carbon emissions, generate local jobs and reduce dependence upon imported fossil fuel. Local and district heating options that incorporate these choices can have a genuine impact on reducing emissions.

Despite long-term energy savings, the upfront investment required for green heat systems can prevent households and businesses from adopting them. We will explore programming and financing ideas to support households and businesses in green heating options.

What is Biomass or Bioenergy?



Biomass energy or bioenergy refers to all forms of renewable energy that are derived from plant materials produced by photosynthesis. Biomass fuels can be derived from wood, agricultural crops and other organic residues. These fuels can be obtained from many sources in Canada, including sawmills, woodworking shops, forest operations and farms.

Electrification of Winnipeg Transit

Manitoba has been a pioneer in electric bus technology. The current demonstration of four battery-electric buses with Winnipeg Transit is the most advanced electric bus project in Canada, and one of the most advanced in the world.

An opportunity exists to build on this early success by increasing the implementation of electric buses beyond the current pilot project. But this has to be considered in a practical and cost-effective way. The Manitoba government and the City of Winnipeg have been jointly exploring options on how to increase the number of electric buses, and how to address the key planning and electric infrastructure issues around integrating the new technology into a complex transit system that has, so far, been designed around the characteristics of conventional diesel buses.

Based on current diesel consumption, a longer-term goal of fully electrifying and decarbonising transit would translate to GHG emissions reductions of more than 50,000 tonnes per year. At the same time, electrifying transit provides other benefits besides reduced GHG emissions. These include lower fuel and maintenance costs, improvements in local air quality, reduced noise and enhanced energy security.

Community Energy Planning

Community Energy Plans (CEPs) are tools that can support municipalities' efforts to better understand their local energy use and costs, as well as consider future growth needs, identify opportunities to conserve and improve energy efficiency, reduce GHG emissions in the community, and help drive local economic development. CEPs take an integrated approach to energy planning by aligning energy, infrastructure and land use planning.

Manitoba Hydro has partnered with Dauphin and The Pas to deliver a two-year pilot Community Energy Efficiency Project. The pilot project involves bringing together local governments, Manitoba Hydro and community members in the creation and implementation of local community energy efficiency plans. Such plans provide guidance for lowering energy consumption in the community and leverage existing Power Smart programs for energy efficiency upgrades in residential, commercial and industrial sectors. To assist the communities in developing their energy plans, Manitoba Hydro provided them with profiles of their energy consumption patterns for use in setting priorities and establishing goals and objectives.

The focus of the current pilot program is on energy efficiency to help reduce energy consumption and lower utility bills in the participating communities. Efficiency

Manitoba could expand this pilot program to additional communities throughout Manitoba and could include opportunities beyond energy efficiency. An expanded Community Energy Efficiency Project could assist municipalities to:

- better understand their local energy use and needs
- identify opportunities for energy efficiency and conservation
- consider options for local clean energy generation
- support local economic development
- develop other plans to meet their energy goals

An expanded project should also take an integrated approach to energy planning by ensuring municipalities align their community energy plans with infrastructure plans and land-use development plans, as required by provincial planning regulation under The Planning Act.

Off-Grid Communities

The majority of Manitobans are served by renewable electricity provided by Manitoba Hydro. Four northern communities that are not connected to the grid, however, rely on diesel generators for their electricity. These generators are sources of carbon emissions, among other pollutants, and are dependent on the delivery of diesel fuel — typically by winter road — an option that is becoming increasingly uncertain as winters shorten and average temperatures increase due to climate change.

The Manitoba government is working with the communities, Manitoba Hydro, the federal government, and the private sector to explore options for replacing diesel generations with clean and renewable sources of electrical energy. This shared commitment could help communities reduce energy costs, save money and create local jobs.

Carbon Pricing

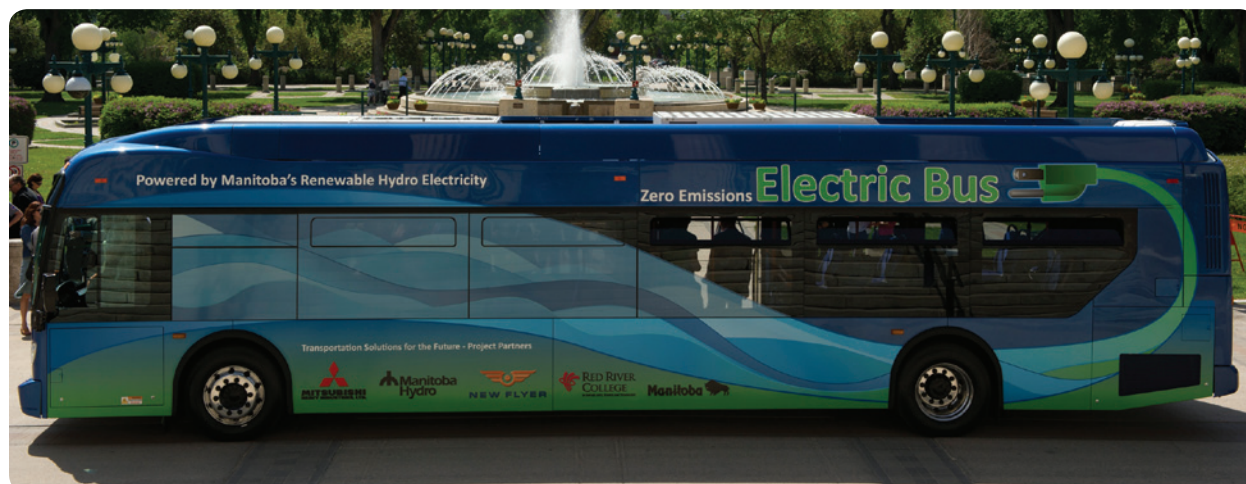
The federal government is requiring all provinces to put carbon pricing in place beginning in 2018. If we do not create our own carbon pricing system for Manitoba, Ottawa will impose one on us.

Currently, nearly 85 per cent of all Canadians pay a price on carbon. British Columbia (BC) was the first province to introduce a price on carbon, in the form of a carbon tax. Since its introduction in 2008, carbon emissions in BC are down 5.5 per cent, while the province's economy has grown by 12.4 per cent.

Elsewhere, Quebec and Ontario have cap-and-trade systems, linked to California's carbon market, and Alberta has a hybrid system containing both a carbon levy and performance-based emissions standards.

There are two basic types of carbon pricing: a carbon levy or a cap-and-trade system on large industrial emitters. A cap-and-trade system would not work in Manitoba, as there are only a few large emitters that would qualify. It would put the full burden to reduce emissions on just a few companies in our province. This would not reduce emissions by a significant amount and would require costly red tape to set up and administer.

A carbon levy is simpler and more effective for Manitoba. It can cover more emissions in our economy leading to more reductions, which is the goal. It gives price certainty to business, helping them plan and invest accordingly. And it costs less to put in place than any other system.



What is Carbon Pricing?

Carbon pricing refers to mechanisms that put a price on carbon with the goal of reducing GHG emissions.

Carbon pricing encourages the conservation of fuel, promotes the adoption of clean alternatives, and pushes companies, scientists and engineers to develop newer and more innovative clean energy technologies — technologies we need now and in the years ahead.

Your comments, ideas and suggestions related to the Carbon Pricing keystone and revenue recycling options are valuable to government. Please consider sharing your views via our online discussion page at: www.manitobaclimategreenplan.ca.

Federal Legal Authority

In 2016, the federal government announced that beginning in 2018, all provinces and territories must have either a carbon tax or cap-and-trade carbon pricing system in place with certain conditions. They call this the 'benchmark'. For those jurisdictions that do not introduce a carbon price, the federal government will impose one. They call this a 'backstop'. It would impose a carbon levy of \$10 per tonne in 2018, rising by \$10 per tonne each year to \$50 per tonne in 2022. In doing so, the federal government would also decide how to spend Manitobans' money.

To clarify federal legal authority to impose its backstop carbon pricing plan on provinces, Manitoba asked for an independent legal opinion from an eminent Manitoba legal scholar. That opinion can be found here www.manitobaclimategreenplan.ca.

It concludes: *"There is a strong likelihood that the Supreme Court of Canada would uphold the proposed carbon tax/levy. It would probably do so on the basis of the federal government's taxation power."*

The opinion holds: *"The backstop measure, in and of itself, is unlikely to render an otherwise valid federal carbon tax/levy unconstitutional."*

In short, the federal government has the constitutional authority to impose its carbon pricing scheme on Manitoba in the absence of our own.

The opinion goes on to suggest, however, that an effective Made-in-Manitoba approach could be legally successful on the basis of equality of the provinces and the potentially discriminatory application of the federal backstop feature.

"A credible (though untested) argument, however, could be made about the potentially discriminatory application of the backstop feature. Suppose Manitoba adopted its own "Made-in-Manitoba" overall GHG reduction plan, which would reduce GHG emissions just as effectively as the approved federal measures (these are a specific carbon tax/levy or a cap-and-trade scheme, to the exclusion of all other types of measures which might be adopted by other provinces).

Manitoba could then argue the federal government was arbitrarily denying its authority to craft its own legislative measures in response to the issue of GHG emissions. The federal government, according to the argument, would as a result be acting inconsistently with the principle that all provinces have equal authority to legislate within areas of provincial jurisdiction."

Independent Legal Opinion to Province of Manitoba

Two things are clear from this legal opinion. *First*, Ottawa can – and will – impose its own plan on Manitobans. It has the authority to do so. *Second*, an effective Made-in-Manitoba plan rests upon a sound legal basis.

A Made-in-Manitoba Carbon Pricing Plan

The Manitoba government has committed to introducing carbon pricing to help tackle climate change. But any carbon pricing mechanism must be based on Manitoba's unique environmental and economic realities not one imposed by the federal government. The federal backstop is wrong for Manitoba. It does not respect Manitoba's green record.

Any carbon pricing system in Manitoba must recognize two essential facts: First, Manitoba is already 'clean' given our hydroelectricity system with 98 per cent of electricity generated from non-carbon emitting sources. Second, Manitobans have already invested billions of dollars in building our clean energy system and are still doing so with the Keeyask Dam and the Bipole transmission line. Adding a \$50 per tonne carbon price on Manitobans at the same time Hydro rates are rising is neither fair nor sensible.

If Manitoba had not embraced clean hydro, then emissions in the province would be double what they are today – 42MT rather than 21MT. Manitobans deserve credit for this early action and massive public investment. These previous contributions will be recognized in our Made-in-Manitoba carbon pricing policy. They need to be recognised by the federal government too.

We want to do our part but we have already been doing our share.

The federal government should recognize this just as they recognized actions taken by other provinces for their climate plans. Every other province with a previous climate and carbon pricing plan had it recognized by Ottawa at the outset, in the design of its benchmark and backstop provisions. One was not imposed on them. Manitoba should receive the same equal treatment.

The purpose of carbon pricing is to reduce emissions. It is not about having a new tax to simply raise more money for government. Because Manitoba is already 'clean' with its hydroelectric power grid, it will require higher carbon prices to achieve equivalent emissions reductions compared to other provinces. That would mean higher and higher carbon prices for fewer and fewer relative emissions reductions. That makes no sense.

The federal government and the opposition parties in the Manitoba legislature want higher carbon prices on Manitobans. That is wrong for Manitoba. It will hurt Manitobans without helping the environment.

Higher Carbon Prices by Ottawa and Manitoba's NDP Government

Both the federal government and the previous NDP government in Manitoba advocate for high carbon prices than the Made-in-Manitoba plan. Here's what their proposals would mean to you:

The cost of meeting the federal government's 2030 target applied to Manitoba would be around \$230 per tonne or 48¢ more per litre of gas.

The cost of meeting the previous provincial government's greenhouse gases reduction target would be around \$270 per tonne by 2030 or 57¢ more per litre of gas.

Both of these plans would impose an intolerable financial burden on Manitoban families and businesses – already facing one of Canada's highest tax burdens - to meet completely unrealistic targets for our province. Their approaches would cripple our economy and raise costs for every household and business in Manitoba.

The federal government has made it clear that if Manitoba does not implement its own carbon pricing plan, then Ottawa will impose its own plan. All of the money generated by Ottawa's plan would go to the federal government for spending in Manitoba as they see fit. It would be based on Ottawa's priorities not those of Manitobans.

This is not acceptable. Doing nothing, therefore, is not an option. We need a Made-in-Manitoba plan that works for us to keep the federal government from imposing its high-priced carbon plan on Manitobans.

A Made-in-Manitoba climate change plan requires a Made-in-Manitoba carbon price to make it work. That price is not \$50 per tonne as the federal government says it would impose.

The Manitoba Climate and Green Plan proposes instead a Made-in-Manitoba carbon pricing with a low, flat carbon price of \$25 per tonne – half the price of the federal government. It will start *and stay* at \$25 per tonne. It will not rise to \$50 per tonne as the federal government wants. We call it the *Prairie Price* – low and level like the prairies.

In 2022, a formal national review of the country's climate policies and carbon pricing by governments will occur. We will resist as detrimental and unnecessary any efforts by the federal government to impose a higher carbon price and additional carbon taxes on Manitobans before this review. We will conduct our own assessment of progress and report to Manitobans and all Canadians at the end of the first five-year Manitoba Savings Carbon Account period in 2022 as set out in our Made-in-Manitoba plan.

The federal government needs to recognize the flexibility of approaches of Canadian federalism including Manitoba's. As Manitoba's independent legal opinion concluded:

"...the Paris Agreement is more flexible about the global-state (including global-Canada) relationship, than the carbon tax/levy is flexible about the Canada-provinces relationship."

NDP Government Inaction on Climate Change

The Auditor-General examined the previous NDP government's climate change plan and actions, stating: "Despite the efforts of the Department and government over the past decade, there has been little change in Manitoba's greenhouse gas emissions."

The Auditor-General further concluded: "There was no regular progress reporting on whether the climate change project was on time, on budget, and going to achieve its stated goals."

In fact, the Auditor-General determined that: "The Department was aware by the fall of 2009 that the initiatives in its 2008 plan would be insufficient to meet the 2012 target enshrined in the *Climate Change and Emissions Reductions Act*."

*Managing Climate Change,
Report of the Auditor-General, 2017*

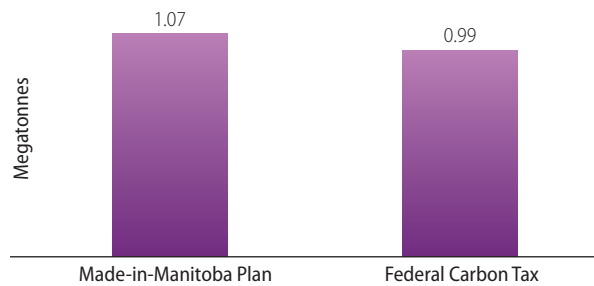
Made-In-Manitoba – Better for the Environment and Better for the Economy

Our 'Prairie Price' costs less yet actually reduces more emissions than the federal plan. It does so by starting at a higher rate causing more emissions reductions at the outset that build up faster than the federal price does. By staying at \$25 and not rising, it costs less to Manitoban families and businesses than the federal price over the five-year period. It makes sure Manitoba families and businesses are not subject to higher and higher carbon costs year after year. It gives Manitoba businesses more certainty and consistent costs for their own investment planning.

Our plan is better for the environment and better for the economy. It reduces more emissions than the federal plan, costs less to the economy, and lets Manitobans decide how they want their carbon tax revenue re-invested.

The following figure compares the estimated emissions reductions achieved under the Made-in-Manitoba plan compared to the federal carbon tax plan.

Cumulative Emissions Reductions (2018-2022)

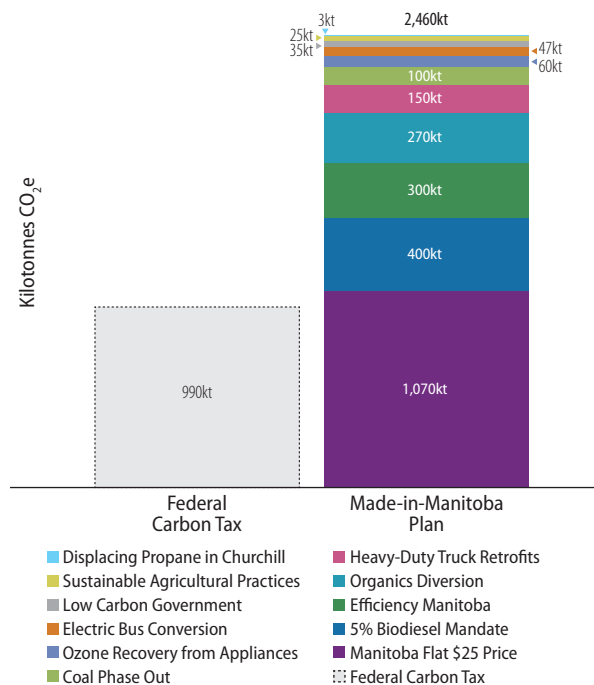


The federal \$50/tonne carbon pricing plan would actually result in 80,000 tonnes fewer emissions reduced by 2022, compared to the Made-in-Manitoba carbon pricing plan.

Our plan is better for Manitoba. Keep the carbon price lower by recognizing these early Hydro investments and use targeted actions to get even more emissions reductions from specific sectors. The sector emissions reductions set out in the next section will generate over 1 million more tonnes of cumulative carbon emissions reductions over the next five years, compared to the federal carbon tax.

When these two are put together, our Made-in-Manitoba plan will reduce carbon emissions by 2,460 kilotonnes – **over twice as much** as the federal carbon tax. The figure below shows this.

Federal Plan vs. Made-in-Manitoba Plan
(Estimated Cumulative Emission Reductions, 2018-2022)



Savings of the Made-in-Manitoba Carbon Tax Compared to the Federal Carbon Tax*

Over the next five years, the average Manitoba household will **save an estimated \$240** under the Made-in-Manitoba plan compared to the federal plan. In 2022 alone, **those savings will be worth \$240** per household when the Made-in-Manitoba price will be half the federal price.

In total, Manitoba taxpayers and businesses would pay about **\$260 million less** in carbon taxes under the Made-in-Manitoba plan compared to the federal plan.

*Estimates based on 2015 emissions reported under ECCC National Inventory Report, 1990-2015. Savings from natural gas heating and vehicle use.

Our Made-in-Manitoba plan will mean more emissions reductions at less cost to Manitobans.

Costs less, reduces more: two good reasons for a Made-in-Manitoba carbon and climate plan.

Manitoba to have second-lowest carbon price in Canada

| 2018 | 2022 | |
|------------------------|------------------|--|
| BC = \$35 | \$50 | New BC government to raise by \$5/tonne each year |
| AB = \$30 | \$50 | Agreed to follow federal plan beginning in 2021 |
| SK = \$10 | \$50 | Imposed federal backstop presumed |
| MB = \$25 | \$25 | Made-in-Manitoba Prairie Price |
| ON = \$18 | \$22 floor price | Cap-and-Trade price forecasted* |
| QC = \$18 | \$22 floor price | Cap-and-Trade price forecasted* |
| NB = \$10 | \$50 | Agreed to following federal plan beginning in 2018 |
| NS = Under development | | Federal equivalency for NS internal cap-and-trade plan |
| PEI = \$10 | \$50 | Agreed to following federal plan beginning in 2018 |
| NL = \$10 | \$50 | Agreed to following federal plan beginning in 2018 |

*Ontario Energy Board Long Term Carbon Price Forecast Report (2017)

Output-Based Pricing for Large Emitters

Our Made-in-Manitoba plan takes steps to protect economic growth and jobs.

To minimize competitiveness and carbon leakage risks to Manitoba's large industrial emitters who are emissions-intensive and trade-exposed, the province will bring in an output-based carbon pricing system. This form of carbon pricing has been recommended to the government by the companies themselves. The system will be transitioned into place during 2019 and will be

developed in full consultation with affected firms. It costs them less than simply applying the carbon pollution levy to them thereby reducing the actual cost impacts of carbon pricing passed onto customers.

Here's how it works.

Output-based pricing applies the carbon pollution price to that portion of facility's emissions that exceed a designated emissions-intensity performance standard for that type of facility. Facilities that emit less than is allowed on an annual basis based on their performance standard, would receive a credit for each tonne of surplus CO₂ between the standard and what was actually emitted. Facilities that emit more than is allowed under the performance standard would be required to pay the carbon levy on a per tonne basis for each tonne of CO₂ emitted above that standard. Alternatively, they could use any surplus credits they previously accumulated and banked from previous years, or purchase credits from another firm in the output-based carbon pricing regime.

The benefit of this system to large emitters is that only a specific portion of their emissions are subject to the actual carbon price (via the performance standard) so it is less economically impactful on their business. At the same time, the firm can benefit from reducing its overall emissions to avoid paying some or all of the carbon levy and to acquire credits for future trading.

This form of pricing will only apply to large industrial emitters over the 50,000 tonne threshold. It will not apply to municipal landfills or government operations.

Agricultural Exemptions

Agriculture is a mainstay of the Manitoba economy. Farms and farmers grow the food we eat. They are 'price takers' in the domestic and global economies giving them little room to manage rising costs such as fuel. We must take this into account when devising any carbon pricing plan.

Accordingly, the Made-in-Manitoba plan will include two important exemptions for farmers and agricultural operations:

First, farm operations will be exempt from the application of the carbon levy for fuel use for their farming operations. Marked fuels will not increase due to any carbon pricing being applied on diesel or gasoline at the wholesale, distribution, or pump levels.

Second, agricultural emissions will not be targeted for direct sector reductions via the carbon price or other aspects of this plan.

Reducing agricultural emissions will occur over time through a range of other policies and actions that will be developed with the farming community and agricultural sector.

Revenue Recycling Opportunities

A clear advantage of carbon pricing is in its ability to generate revenue that can be recycled back into the economy. At \$25 per tonne, Manitoba's carbon price is expected to generate approximately \$260 million in annual revenue.

Over the past year, the Manitoba government has been consulting with Manitobans on how to best utilize the new carbon revenue. Manitobans have told us that they would like to see the carbon revenue redirected back to Manitobans in ways that are both transparent and accountable.

Revenue recycling refers to the process by which funds generated from a carbon price are distributed or 'recycled' back to people and businesses. Unless we have our own Made-in-Manitoba plan, Ottawa will determine how and where that revenue is spent, not Manitobans. Have your say in where this revenue should go. Visit www.manitobaclimategreenplan.ca and make your choice. Help determine where carbon revenue should be re-invested.

In a previous survey, Manitobans told us how they would like to see the carbon revenue spent. Here are the main carbon revenue recycling options we heard: relief to households, investing in green projects, business competitiveness, clean technologies, and helping Manitoba adapt to a changing climate.



That is why the Manitoba government will introduce new carbon pricing and revenue recycling legislation that mandates the annual release of a carbon pricing and revenue report as part of the provincial budget, indicating how every single dollar from the carbon price is spent.

Three principles for revenue recycling will be established:

First, all revenue collected will go to Manitoban priorities.

Second, all revenue collected and distributed will be accounted for and reported on annually for all Manitobans to see.

Third, all revenue collected will focus first and foremost on lessening the carbon levy impact on lower and middle-income Manitobans and their families.

Relief to Households – Carbon pricing will inevitably lead to changes in prices, especially for fossil fuels such as gasoline and natural gas. This revenue recycling option would see carbon revenue used to help offset increased carbon price costs to Manitoba households. This could be used to help offset the impacts of any hydro electricity rate increases also.

Investing in Green Projects, Business Competitiveness, and Clean Technologies – The ultimate objective of carbon pricing is to reduce the amount of carbon pollution being released into the atmosphere, not hurt the economy. This revenue recycling option could see some of the carbon revenue invested into green projects and clean technologies that would drive further carbon emissions reductions.

Adapting to Climate Change – Impacts of climate change are already here and happening. This revenue recycling option could see some of the carbon revenue focused on building green, resilient infrastructure such as agricultural drainage systems and water retention systems to meet challenges posed by floods and droughts.

Sector Emissions Reductions

As important as having a price on carbon is, it can only take us so far. Carbon pricing coverage and price per tonne would have to be set much higher than what is being discussed in order to drive the level of emissions reductions required to meet all our climate ambitions. That's where complementary climate actions that target emissions reductions in specific sectors come in.

Our Made-in-Manitoba plan combines a lower carbon price with targeted sector emissions reductions to achieve greater results than with the federal carbon price plan alone.

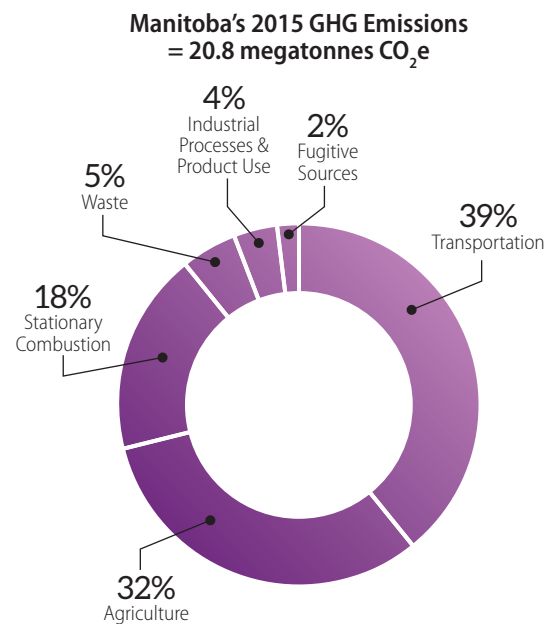
From 2018-22, our plan will achieve more than twice as many emissions reductions as the federal carbon tax. Over half of those projected emissions reductions will come from non-carbon pricing actions.

More emissions reductions at a cheaper economic cost is the Made-in-Manitoba plan. Better for the environment and better for the economy.

The following initiatives are currently being considered to support the sector emissions reductions keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Transportation Emissions

Transportation helps connect people and businesses to the goods and services they need, thereby playing a vital role in Manitoba's economy and the well-being of its citizens. At the same time, our most common forms of transportation produce emissions that are harmful to the environment and human health. Transportation is Manitoba's largest source of carbon pollution, representing 39 per cent of the province's total carbon output. Despite fuel-efficiency gains and stricter emissions standards for vehicles, more cars and trucks on the road have resulted in higher carbon emissions from transportation in the province.



Over 93 per cent of transportation in Manitoba currently relies on fossil fuels. Although the use of fossil fuels is expected to persist into the foreseeable future, there are other clean transportation fuels available to help Manitoba achieve sustainable economic and environmental performance.

Manitoba has been a leader in the production and adoption of biofuels. We were the first jurisdiction in Canada to adopt a biodiesel mandate for diesel fuel. Our ethanol mandate is 8.5 per cent, and is the highest blending requirement in the country. Replacing petroleum fuels with clean biofuels has reduced carbon emissions in the province by over three million tonnes since its introduction.

What are Clean Fuels?

Biofuels refers to ethanol, biogas, biodiesel and renewable diesel.

Biodiesel is a non-toxic and biodegradable renewable fuel source typically made from oils such as vegetable oils, animal fats or used cooking oils.

Biogas is a renewable natural gas derived from organic waste sources such as landfills, wastewater and farms. Biogas is completely interchangeable with conventional natural gas and compatible with existing natural gas pipelines.

Ethanol is a high-octane, renewable fuel source derived from primarily agricultural or forestry waste products.

Renewable diesel is a biomass-based renewable fuel source that is almost chemically identical to petroleum diesel.



We can do more to continue our leadership in clean fuels, and Manitoba is considering increasing the use of biofuels across the province. For example, we can encourage the voluntary use of ethanol by working to get mid- and high-level ethanol blends at retail filling stations for use in flex fuel vehicles. We can also raise the provincial biodiesel mandate from two per cent to five per cent, which would achieve an additional 100,000 tonnes of CO₂e reductions annually. In combination with fuel efficiency, these actions can help to drive further emissions reductions and spur innovation in clean fuels.

Manitoba is well positioned to provide canola feedstock for enhanced biodiesel production, due to an increase in the mandate from two per cent to five per cent since it is already one of the top two crops grown in the province. Biodiesel's life cycle greenhouse gas emission level varies according to the crop used, which is where canola might have a competitive advantage over other feedstocks. Canola consistently ranks as the best biofuel feedstock when calculating net carbon emissions.



The federal government has announced they will be introducing a new national clean fuel standard that will reduce Canada's carbon emissions by 30 MT per year by 2030. Meeting this new national standard will likely require measures to advance clean fuels that are over and above biofuel mandates alone.

One of the greatest opportunities for reducing transportation emissions is through electrification. Manitoba is an ideal place for the adoption of electric vehicles that plug-in to the electricity grid and obtain energy for motive operation. Because of our cold climate we already have more than 500,000 existing plug points at home and at work, and everyone is already accustomed to plugging in.



Innovation in trucking design can lead to more fuel-efficient outcomes. We will work with the Manitoba Trucking Association to advance the take-up of effective innovations for Manitoba's trucking fleet that help reduce emissions.



As Canada moves to pan-Canadian climate action, it will become increasingly important to harmonize trucking and vehicle regulations and rules across jurisdictions that encourage fuel efficient and climate-friendly operations.

Trucking is a long-term investment by companies and owner-operators. It is expensive to replace heavy-duty vehicles to take advantage of fuel efficiency improvements. We will encourage the federal government to improve the accelerated capital cost allowance rules surrounding new, fuel-efficient truck and engine replacement.

Rural and northern households have greater obstacles to reducing transportation emissions than urban households due to longer travel distances that are part of daily life and less flexibility to shift to lower carbon transportation. Policy approaches need to account for this.

Active and Public Transportation

Like so many places, Manitoba has built its economy and communities around the motor vehicle. We have more than 80,000 kilometres of roads, over one million registered vehicles, and related infrastructure such as countless bridges, underpasses, parking lots and traffic lights — all of which helps us get around quickly and safely.

But there are some things associated with our cars and roads that we could certainly do with less of, like traffic, pollution, and the negative health effects associated with spending too much time in our vehicles.

Fortunately, we have options. More and more Manitobans are rediscovering the freedom of biking, walking, running and taking public transportation. There are, for example, more than 12,000 daily cyclists

in Winnipeg in May and June. Such activities can help reduce harmful emissions, improve health and save money, too. Options to support greater use of active or public transportation are being considered including more bike paths and lanes.

Waste Emissions

Solid waste accounts for about five per cent of Manitoba's greenhouse gas emissions. Organic materials buried in landfills produce methane gas, which can seep out of the ground and into the air. Approximately 40 per cent of residential waste and 30 per cent of industrial, commercial and institutional waste that ends up in landfills is organic material.

Methane is a powerful greenhouse gas that locks in 25 times more heat than carbon dioxide.

To reduce the amount of organic material going into landfills — and thus the resulting methane emissions from waste — the Manitoba government could consider the following actions:

- Implement a landfill disposal ban on organic materials.
- Work with food processors, grocers, hotels, restaurants and other stakeholders to promote best composting practices and provide supports and incentives, research, training and market development.
- Increase the Waste Reduction and Recycling Support landfill levy and use the revenue to support compost facilities.
- Develop a comprehensive food waste reduction and prevention initiative, in partnership with other jurisdictions and key community groups.
- Pursue measures to mitigate methane emissions and enhance methane gas capture at landfills.



Recycling non-organic materials, especially those containing ozone-depleting substances, is also critical to cutting our carbon footprint and creating sustainable communities.



To enhance diversion of non-organic waste from landfills, the Manitoba government could consider the following actions:

- Expand the household hazardous material Extended Producer Responsibility (EPR) program to include ozone-depleting substances and other halocarbon cylinders, single-use pressurized containers, foam insulation and refillable propane tanks, smoke and

carbon monoxide detectors, medical sharps and veterinary products.

- Establish new EPR programs for appliances with refrigerants (e.g., fridges, air conditioners, water coolers) and small appliances.
- Implement landfill disposal bans on materials currently managed by product stewardship organizations, starting with electronic waste, batteries, tires, household hazardous waste, beverage containers and cardboard boxes.
- Introduce measures to increase the diversion of construction, renovation and demolition waste such as wood and shingles.

Agricultural Emissions

Agriculture is a key industry in Manitoba. Our vast and diverse land base, highly skilled workforce, and value-added processors enable our province to be a world leader in agriculture and food processing. Agriculture creates jobs, promotes trade, supports research and development of cutting-edge technologies, attracts investment, and propels economic growth.

Agriculture is the second-largest source of greenhouse gas emissions in the province, contributing about 32 per cent to Manitoba's total emissions (excluding fuel-use emissions). These emissions are primarily due to the application of nitrogen fertilizer to soils and biological processes such as enteric fermentation (burping) inherent to livestock.

While agriculture is a significant source of greenhouse gas emissions, agricultural soils and biomass can also serve as effective carbon sinks, helping to lock harmful carbon emissions in the ground and prevent carbon dioxide from entering the atmosphere. Manitoba is one of three provinces — along with Saskatchewan and Alberta — where agricultural soils are now considered to be a net sink for carbon storage, due to improved agricultural practices such as reductions in tillage and better rotational practices.





A **carbon sink** is any activity or process that removes carbon emissions from the atmosphere and stores them in the natural environment.

In fact, Manitoba and Canadian producers have been continuously improving their overall sustainability and production efficiency, including:

- 14 per cent less GHG per kilogram of beef liveweight in 2011 compared to 1981
- decreased enteric fermentation emissions per litre of milk by about 20 per cent since 1996
- large decreases in the area of crop residue burning since 1990
- steadily increasing average grain yields per acre of cultivated land

Manitoba's farmers are at the frontlines of climate change and need to be at the forefront of solutions. Farmers have seen firsthand the effects of a changing climate. Extreme weather and precipitation events are negatively impacting production while climate change is altering growing seasons and the types of crops that farmers can grow. There are numerous examples of creative responses by farmers to the challenges of extreme weather and climate change abound. But to achieve widespread adoption of the most effective climate change responses, farmers require support at various levels to adapt and become more resilient.

Reducing emissions from agricultural activity while simultaneously supporting this valuable sector will require research, innovation, planning and support. The Manitoba government is committed to working with producers and consumers alike to identify and develop the solutions we need to make agriculture an integral part of our vision of a clean, green and climate-resilient province.

Ecological goods and services are the environmental benefits derived from healthy ecosystems. They include market goods produced from ecosystems (commodities, food and fibre); improved wildlife habitat, or the benefits from ecosystem processes (water purification or carbon storage) and non-material benefits (recreation, aesthetic value).

The Manitoba government could consider the following initiatives to enhance the resiliency and sustainability of the agricultural sector:

- implementing a province-wide ecological goods and services program, in partnership with landowners, non-government organizations and federal and municipal governments, based on an Alternative Land Use Services (ALUS) model, to help reduce flooding, and improve water quality and nutrient management, protect and enhance biodiversity and provide other ecological benefits to society
- supporting on-farm beneficial management practices (BMPs) that provide climate change adaptation and mitigation benefits to agricultural operations
- developing a Centre for Sustainable Agriculture to support adaptation and resilience research, to seek new technologies to decrease emissions from crops and livestock, and to explore commercialization opportunities
- expanding the adoption of new precision farming technologies such as machine learning that improve the environmental efficiency of fertilizer use and farming patterns
- supporting research and commercialization of technologies for the use of natural fibres for bio-composite applications, including the expanded use of bio-energy and other bio-products with partners such as the Composites Innovation Centre
- evaluating risks, vulnerabilities and opportunities facing agricultural regions or sectors in Manitoba due to extreme weather events and climate change; and developing strategies to address identified risks, vulnerabilities and opportunities



Coal Phase Out

Manitoba's last remaining coal-fired generating unit has been in operation since 1969. Although usage has declined in recent years, the Brandon-area unit still produces between 30,000 and 100,000 tonnes of GHG emissions annually.

The Manitoba government has worked with Manitoba Hydro to accelerate the cessation of coal burning at the Brandon facility ahead of schedule, in 2018.

Low-Carbon Government

The Manitoba government seeks continuous improvement in greening operations with the intention to lead by example. As one of our largest employers with offices and operations throughout the province, the government is committed to taking action to reduce its own carbon footprint.



The Manitoba government is considering the following initiatives to put government operations and infrastructure on a path towards carbon-neutrality:

- advancing provincial green building standards for government-owned buildings and new construction activities
- exploring electric vehicle charging infrastructure at government-owned buildings
- increasing zero-emission vehicles in the government fleet
- exploring sustainable procurement and reduction initiatives for paper and other common goods

Many of the initiatives bring about long-term savings for government by reducing operating and maintenance costs, thereby helping government to achieve both environmental and fiscal sustainability.

Carbon Offsets

Nature is a powerful tool that we can harness to help reduce emissions. Carbon offsets are an innovative, market-based mechanism that rewards businesses and

organizations for undertaking new projects that reduce or remove carbon emissions from the atmosphere. Credits earned through such a system could be traded in Manitoba, North America, or possibly internationally. An example of a trading system is the Western Climate Initiative.

The global carbon market is expected to grow exponentially in value from \$300 million US in 2011 to \$2 trillion by 2020. By 2020, carbon is anticipated to be one of the primary traded commodities across the globe. Manitoba farmers could gain financially from participating in such markets.

In partnership with other jurisdictions, the Manitoba government will explore ways to develop a carbon offset program involving agriculture, forests and wetlands. We will adopt or develop protocols for potential carbon offset projects such as:

- land use conservation measures such as restoring forests, soil management practices like low or no till farming, wetland restoration and conservation
- the capture and destruction of methane gas from landfills and livestock manure storage facilities, or combustion of this energy to produce electricity or heat
- waste recycling
- energy efficiency and non-emitting renewable electricity generation



Energy Efficient Homes and Buildings

The Manitoba government has committed to reducing emissions from homes and buildings. Annually, space heating for residential buildings generates approximately 1,000 kilotonnes of carbon dioxide, representing about five per cent of Manitoba GHG emissions. Commercial and institutional buildings generate approximately 1,300 kilotonnes of carbon dioxide annually, equal to six per cent of Manitoba GHG emissions.

Efficiency Manitoba will offer new expanded home energy efficiency programs for retrofits and upgrading.

The Manitoba government will collaborate with its federal, provincial and territorial partners to raise and

harmonize its building codes and standards that improve the energy efficiency of new residential and commercial buildings.

Manitoba commercial building sector organizations such as the Building Owners and Managers Association, Building Energy Management Manitoba and Canada Green Building Council, actively support energy efficiency in existing buildings. Based on the strength of their experience, the Manitoba government will also work with the sector to develop a strategy to meet the following goals by 2030:

- recommission 80 per cent of buildings that are not meeting high-performance energy standards
- undertake deep retrofits for 60 per cent of buildings to meet high-performance standards

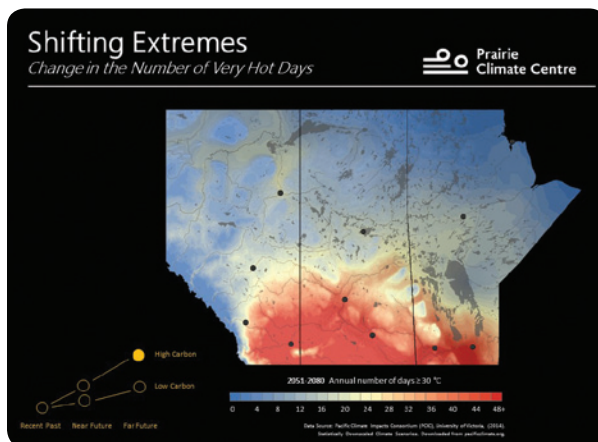


Adaptation

Climate change poses real and potentially significant challenges to our environment, economy and the social fabric of our communities. Many regions across Canada have experienced extreme weather events such as flooding, drought, blizzards, hurricanes, tornadoes, heat waves and wildfires. These extreme weather events are becoming more common and more severe. The expectation is that this will continue into the future.



According to work developed by the Prairie Climate Centre at the University of Winnipeg, there are real risks for Manitoba, especially associated with increasing temperatures, changes in precipitation, and negative impacts on communities, infrastructure, the economy and nature. Climate change is not just an intangible and far-off issue. Every indication is that it's happening now and will increasingly become more challenging.



The damage caused by record-breaking extreme weather can be costly. Private insurers have paid out billions of dollars over the past years for losses caused by natural disasters. These amounts are up to 10 times what was paid out even a decade ago. These ultimately result in higher customer premiums. Governments have paid out even larger amounts in disaster payments and repairs to infrastructure. The Fort McMurray wildfire is estimated to exceed \$8.8 billion in financial, physical, social, health and environmental losses. Here at home, the 2011 spring flood in Manitoba cost the government

\$1.2 billion and costs continue to rise with recent flooding in the past few years. This is money taken from other priorities such as health care and education.

Extreme weather and the damages and social costs associated with it, should be seen as a warning sign of things to come. Adapting to a changing climate is becoming the new normal. We need to prepare for and take action in response to actual or anticipated climate impacts to minimize their adverse impacts on our economy, environment and the communities in which we live.

Adaptation is about becoming stronger and more resilient in the face of climate change risk. It means investing today for tomorrow.

Adaptation refers to taking action now to reduce the impacts of current and future climate change events such as floods, droughts and wildfires.

The following initiatives are currently being considered to support the Adaptation keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Climate Knowledge

Understanding how Manitoba's climate is changing and how that might impact us is essential. This knowledge strengthens our ability to plan and make informed decisions about what actions we need to take.

Prairie Climate Centre – The Prairie Climate Centre is a joint initiative of the International Institute for Sustainable Development and the University of Winnipeg. The centre provides governments, businesses, non-government organizations and sectors with reliable climate data and information, enabling them to make informed decisions on addressing climate risk management and adapting to climate change. The Manitoba government has already invested over \$400,000 to support this Made-in-Manitoba research organization. This centre is ready-made to become the regional climate services centre for Western Canada.

Manitoba Centre for Sustainable Agriculture – There is an increasing need to build capacity for agriculture-related climate change research that supports agricultural production, decreased emissions of greenhouse gases, enhanced sequestration of carbon in soil and greater resiliency to extreme weather. The Manitoba government is considering options to support the creation of such a research centre to provide this support

with the involvement of industry, universities, non-governmental organizations, farmers, and agriculture sector.

Indigenous knowledge – There is a recognized need to bridge traditional Indigenous knowledge with science-based approaches, particularly as it relates to impacts on nature and the continuation of sustainable traditional hunting, fishing and other food gathering activities. The Manitoba government will explore options to help ensure that Indigenous knowledge is incorporated in the implementation of the Climate and Green Plan.

Preparedness Planning – Planning to address climate-related risks to critical infrastructure, such as roads and buildings, electricity lines and structures, and waste systems and water control assets, is something all communities should undertake. As well, improved disaster risk assessments, and planning and response measures can help build capacity to respond to climate-induced events and emergencies. Having local communities undertake this assessment with on-the-ground knowledge can help them prepare for a changing climate.



Sustainable and Climate-Ready Communities

Manitobans live in communities — those spaces and places where we settle, work, raise families and share our time with others. We all have an interest in keeping them safe, healthy and well-functioning. Ensuring they are resilient to climate change and offer sustainable living choices must be a priority too.



Human Health – Climate change can impact our health. Extended periods of heat and cold pose dangers to the vulnerable in our society. Smoke and dust from drought and wildfires affect the air we breathe. And floods can contaminate drinking water sources. The Manitoba government is aware of the potential effects of a changing climate on human health and is open to ideas and solutions from communities and organizations on how to best address these concerns.

Climate Resilient Communities – We can design our homes, communities and cities to be more resilient to a changing climate. Examples include:

- creating more permeable water-absorbing surfaces to reduce the cost of drainage infrastructure or the spread of contaminated runoff

- collecting rain runoff from buildings and capturing it in rain gardens
- managing storm water with engineered wetlands and stands of trees
- planting native drought resistant plants in the landscape
- promoting natural shorelines to support better water quality
- increasing green spaces in urban areas
- Smart design can help us mitigate climate impacts and become more resilient to a changing climate.
- Your ideas and suggestions on how the Manitoba government can best support these efforts are welcome.

Sustainable Agriculture

When it comes to agriculture, climate change will likely bring mixed effects, most negative but some positive. For example, canola acres could be negatively impacted by climate change in Manitoba whereas soybean and corn acres will likely be positively impacted by climate change (at least initially), since canola is more sensitive to heat stress and excess moisture than soybeans. Canola will continue to be an important feedstock for cleaner biodiesel fuels, an alternate use that may grow more in the years ahead.

Increased acres of peas, in support of the recently announced Roquette pea processing plant in Portage la Prairie, will reduce the demand for nitrogen fertilizer in our province. Increased acres of soybeans being grown will do the same.



Sustainability in agriculture is also about sustainability in farming practices. Big data is arriving on farms everywhere now. Precision agriculture is a means to more efficiently and effectively utilize technology to farm, saving money and the environment.

Precision farming:

- collects and uses farm machine-generated data to characterize crop economic and environment budget scenarios across different management zones
- develops a precision business plan for a roadmap to build the precision agronomic plan that maximizes profit, and optimizes environmental performance
- evaluates different approaches for unprofitable acres

Satellites, drones, combines and tractor sensors allow for significantly increased abilities to access and utilize data for better on-farm management of input costs and crop yields. This more advanced analysis included looking at:

- cover crop type
- disturbance levels
- biomass levels as they relate to carbon sequestration
- continued monitoring of carbon cycle in project fields

Taking advantage of these new opportunities for Manitoba agriculture must be a real priority.

Jobs

Sustainable development brings the economy and environment together. We need to focus on how to prosper through climate change and create new jobs and growth in the transition to a global low-carbon economy. Environmental services and clean technology are opportunity sectors for Manitoba companies. We have strengths we can build upon. Addressing climate change is a major challenge, but it can present new opportunities for growth. Developing a green and prosperous economy includes a focus on creating decent jobs for all Manitobans in existing and emerging sectors. A Made-in-Manitoba Climate and Green Plan must also be about jobs, growth and prosperity. Carbon pricing and green investment will send critical signals to business that there is economic value in reducing emissions with certainty that they can plan their investments around.



Innovation and Cleantech

Innovation in all sectors will help Manitoba adapt as we address economic, environmental and social challenges. We are in a time of global economic transition to a low-carbon economy. Manitoba has a robust environmental and cleantech sector that employs over 60,000 private and public sector workers in 457 businesses throughout the province, generating approximately \$2.5 billion in revenues in 2015. But the world market is much bigger, projected to grow to \$2.5 trillion in 2020 and \$3.8 trillion by 2030. Seizing this opportunity means we must invest in cleantech research and development innovation and commercialization.

What is Cleantech?



Cleantech refers to clean technology industries. While definitions vary, there is a fairly widespread consensus that these industries are expanding and that they apply advanced technologies to enhance performance and reduce the carbon footprint of residents, industry and the communities. Examples of cleantech industry sectors include renewable energy generation and efficiency, recycling and waste, as well as air, soil and water management and remediation. Environmental industries are closely associated with cleantech industries.

This provides a solid foundation we can build upon to create clean, green economic opportunities, support low-carbon growth and innovation, attract new investment and improve economic competitiveness.

Approaches could include:

- building and strengthening early-stage clean technology innovation and research and development
- accelerating clean technology commercialization and growing Manitoba's commercial capacity in clean technology
- fostering clean technology adoption
- building private and public sector linkages and collaboration for development and export success
- removing barriers in policy and regulations that hinder R&D and innovative ideas
- aligning provincial and federal cleantech support programs
- creating new markets domestically for Made-in-Manitoba cleantech

Clean innovation can be advanced in any sector of the economy, from traditional resource sectors to manufacturing to services. It helps the environment now while producing new pools of jobs.

The following initiatives are currently being considered to support the Innovation and Cleantech keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Green Tape Reduction

Innovation faces financing, commercialization and regulatory obstacles as it proceeds from idea to market. Evidence suggests many of these barriers occur at later-stage development as innovation moves from (a) research (b) development (c) demonstration (d) deployment, and (e) diffusion. Cleantech innovation can face even more. The Manitoba government will undertake a review of government policies, laws and programmes with a climate change and environmental lens to identify green tape market, regulatory and administrative barriers to investing and growing a green, low-carbon economy. This could lead to an eco-fiscal policy reform that could include:

- making green tape reduction a formal, ongoing part of the government's Red Tape Reduction exercise
- undertaking sector-by-sector reviews of policies, regulations and administration that stand in the way of business support program take-up by the environmental industries sector
- removing environmentally harmful subsidies and tax exemptions
- creating better federal and provincial program alignment on policies and business support programs

Opportunity Clusters

In a globally competitive economy, it is important that smaller jurisdictions focus on where they can most succeed. These are opportunity clusters of private and public sector advantage. Manitoba's agricultural sector is an obvious one. Water services is another in the environmental services sector. Identifying our top opportunity clusters based on competitive advantage, public and private sector linkages (particularly with universities, colleges and research institutions), and investment and commercialization readiness, would help build critical mass and leverage public and private resources in a more effective way.

A Green Economy



The United Nations Environment defines a green economy as one that results in improved human well being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy is low-carbon, resource efficient and socially inclusive.



Financing and Investment

A key obstacle to cleantech growth and innovation is access to financing by small and medium-sized enterprises. We need to unlock private sector investment in this area. This means eliminating barriers that hold back investment such as green tape and inefficient business support programs. Government can use targeted financial tools to stimulate private sector investment and strategic government spending. Encouraging new ideas, growing local businesses and finding success in export markets requires a coordinated effort. We have to find more effective ways of linking and leveraging public and private sector partnerships.

The following initiatives could be considered to support the Financing and Investment keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Green Growth Capital

The Manitoba government could establish a Clean Technology Financing suite that leverages provincial and federal programmes for innovation, new business development, growth and export to address environmental challenges in Manitoba and beyond. As part of a larger Made-in-Manitoba investment and capital strategy, the government is reviewing current programs and incentives to ensure they work more effectively while considering new, private sector-led ideas.

Such an approach could include the concept of Green Bonds, which seek to attract private and institutional capital for major projects with defined environmental benefits, such as green strategic infrastructure, to help create new jobs.

Improving Uptake on Business Programs

The Manitoba government currently offers a range of business support programs that are theoretically available to the environmental industries sector. Yet, actual uptake of these programs by the sector is low. Raising awareness of these opportunities would make sense and facilitating matchmaking could increase participation in them. Participation could be enhanced by streamlining administrative application procedures to reduce the business costs of application time and effort.



Promoting Manitoba

Manitoba's clean, green advantage can be a strong driver for low-carbon growth. Companies are increasingly making investment and location decisions based in part on clean energy access. The Manitoba government could partner with the private sector, the federal government and research organizations in the marketing of made-in-Manitoba products and services that showcase our clean energy advantage. Regional and international collaborations, such as trade and investment missions, could be strategically undertaken to address issues and opportunities that support our success in clean energy and sustainable development.

Skills and Training

The low-carbon economy will require an evolving set of new knowledge and skills. We need to make sure Manitobans, particularly young and Indigenous Manitobans are prepared for these new opportunities. Job changes and adjustments can be expected as the global low-carbon economy emerges. Existing workers will need to acquire new knowledge and skills, too. Linking private sector opportunities with educational and training approaches can help bridge opportunities so our province is better positioned to win in this low-carbon economy transition.

The following initiatives are currently being considered to support the Skills and Training keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Green Youth Corps

The Manitoba government could align its youth job opportunity programs into a focus on sustainability. There is also the chance to participate in the Canada Green Corps run by the United Nations Association of Canada. The programme provides four to six month work-integrated learning experiences for unemployed or under-employed youth between 18 and 30 years of

age to help their employers reduce their environmental footprint and increase sustainability. This type of meaningful employment can prepare the next generation with relevant skills for a low-carbon future, while stimulating the local green economy.

Co-op Opportunities and Experiential Learning

Co-op training is an effective way to provide practical job experience to a young person while exposing companies and industries to valuable learning in exchange. Several training support programs for youth are currently offered by the Manitoba government. Assessing them for creating longer co-op opportunities — such as a full semester — could make them even more effective in providing young, talented labour for Manitoba companies.

Education and Training

The Manitoba government could work with the private sector to develop a Clean Growth Talent Plan as part of a new Labour Market Strategy incorporating a focus on climate and sustainability jobs and skills. This could include:

- supporting the development of knowledge and skills needed for the adoption, installation and maintenance of clean technologies, including in Indigenous and Métis communities
- assisting businesses, institutions and communities to adapt to climate change
- building stronger business leadership and management skills to lead companies to rapidly grow and export clean technologies
- targeting young Manitobans and Indigenous Peoples for these opportunities



The Manitoba government could work with Manitoba's schools, universities, colleges and institutes to strengthen the alignment of Manitoba's education and training systems with the knowledge and skills needed now and into the future for climate change and the green economy.

Infrastructure and Adaptation Training

The Manitoba government is considering options for working with engineers and other partners to deliver capacity-building training and skill development programs. Such programs would allow for climate-ready, evidence-based, decision-making tools to be developed for engineers and other infrastructure planning decision makers, especially at the local level. This will encourage integrating the impacts of a changing climate into the full lifecycle of infrastructure, including design, planning and management.



Green Infrastructure

Green infrastructure is a source of new jobs and economic growth. As we invest public revenue in new projects to address climate and sustainability issues, we can ensure priority is attached to important needs like wastewater, drainage, dams and flood outlets.

Nature itself can be used to provide important services for communities by protecting them against flooding or excessive heat, or helping to improve air, soil and water quality. When nature is harnessed by people and used as part of infrastructure, it is called natural infrastructure. Green and natural infrastructure occurs at all scales. It is most often associated with storm water management systems, which are smart and cost-effective. Thinking of green infrastructure as a broader concept, serves to provide an ecological framework for the social, economic and environmental health of our surroundings.

Natural and Green Infrastructure



Natural and green infrastructure refers to an approach to providing services, such as water treatment or flood protection in a more natural way that both protects and enhances the natural environment and offers a variety of co-benefits. For example, instead of building a traditional water treatment plant or water retention structure, the enhancement of a wetland could provide the same services while also serving as important habitat for a variety of species.

The following initiatives are currently being considered to support the Green Infrastructure keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Federal, Provincial, Municipal Dedicated Funding

A changing climate poses increased risks to Manitoba's critical infrastructure systems, including the roads, bridges, buildings, power lines, water control structures, and water and waste treatment facilities that help ensure a high quality of life for all Manitobans. As such, infrastructure design, planning and management needs to take into full account both recent and future climate conditions, including extreme events.

The Manitoba government could work with its funding partners to ensure a sustained dedication of new funding for identified green infrastructure project priorities. This would enhance the resiliency of our infrastructure to withstand climate change pressures.

Flood control infrastructure should be a key priority in this area.



Natural Infrastructure

Nature has its own defences and methods for preserving and regenerating its natural state. We need to harness this. Efforts should be made to increase the use of natural systems such as wetlands to filter wastewater from treatment facilities and reduce and filter local overland flooding to reduce nutrient-laden runoff. Trees and plants assist in soil stabilization and reduce the need for and expense of hard engineered solutions.

A green infrastructure approach views the natural environment from a functional perspective and seeks to put in place mechanisms that protect communities and safeguard critical natural areas.

We would work with communities and the agricultural sector in particular, to identify prospective natural infrastructure projects for support.

Infrastructure Resiliency Assessment and Best Practices

The Manitoba government is considering options for assessing the current level of resiliency of our public infrastructure assets to a changing climate, and developing cost effective options to further prepare and withstand future extreme events. This could include assessing best practices, such as natural infrastructure alternatives like wetlands, green roofs, riparian zones, and trees that provide more enduring resiliency to extreme events such as floods and droughts.

Riparian zones are the transitional zones that are found along streams, rivers, lake shores and wetlands. Often described as wetter than dry, but drier than wet, these areas support unique wildlife and plant communities. Healthy riparian areas have many important functions in our watersheds.



Manitoba is a province with abundant water. We have 900 trillion litres of surface water that covers approximately 16 per cent of the province. We are a land of 100,000 lakes, including Lake Winnipeg, which is the 10th largest freshwater lake in the world. Its drainage basins, or areas that flow into it, are over 40 times larger — 1,000,000 square kilometres in size and home to more than seven million people — and bring water from four other provinces and four states into it.

In Manitoba, there are strong links between a changing climate and the health of our lands and waters. These in turn are linked to the health of our people and communities. Initiatives to address overall water management, water quality and water supply (flood and drought) are required as we move forward with addressing climate change in Manitoba.

Wetlands and Watersheds

Water flows through many different types of landscapes across Manitoba. The activities done on these landscapes and others that border us, influence where and how water flows, the quality of water in our lakes, wetlands, rivers and streams, and the water we drink. The interconnection between land and water activities is easiest to understand in the context of individual watersheds — the geographic areas of land where all water drains to a common point. Groups of smaller watersheds form large drainage basins, like the Assiniboine River Basin or the Red River Basin, for example.

Watersheds are widely recognized as the most effective unit on which to plan, coordinate and manage activities that influence water. Water doesn't respect political boundaries; in Manitoba water flows between municipalities, traditional lands and into and out of other provinces and across the international border. A healthy watershed helps foster a healthy community. It provides safe drinking water, allows for food production and provides natural areas for people to enjoy recreational activities. By strengthening our focus on managing water and activities that influence water on a watershed basis, we can more effectively address beneficial management on an ecosystem basis, where it matters most.



The following initiatives are currently being considered to support the Wetlands and Watersheds keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.



Watershed Planning

The Manitoba government currently uses an integrated approach to watershed planning that balances multiple perspectives and needs. The resulting plan becomes a tool that supports action and decision making by all players on the landscape. Watershed plans are long-range planning documents that help identify actions that can be taken today to improve water quality, foster biodiversity, store carbon in the natural environment, adapt to changes in weather patterns, and build resilience to climate related risks. A watershed-based approach leads to better drainage and water retention, protecting and restoring valuable wetlands, and improved watershed resiliency in the face of floods, drought and extreme weather events.

Manitoba is fortunate to have an existing network of local organizations that are already delivering important ecological goods and services and managing water in local watersheds. With over 40 years experience in land and water management, conservation districts are well positioned to play a key role in managing our watersheds. They provide the local institutional capacity needed to readily adapt to changing local conditions. With the right tools and strategic partnerships, these local boards can evolve to play an important role in coordinating landscape activity and delivering ecological goods and services to improve watershed resiliency. The Manitoba government is consulting on ways to enhance the watershed planning and management framework at both the local and regional levels.



Wetlands

Wetlands are prime examples of a natural ecosystem that provides valuable ecological services. They filter water, store water when it is abundant and save it for when it is dry. They store carbon and provide shelter and food for a myriad of species including plants, insects and animals.

The Manitoba government has committed to a no net loss principle of water retention. This will require protection of wetlands across the province, building on the current policy by enhancing protection of seasonal, permanent and semi-permanent wetlands from drainage activities. While avoidance and minimization are the priorities, Manitoba will be exploring options for a mechanism to allow a more flexible and effective framework for mitigating wetland loss. Work will also continue to inventory wetlands across the province as part of a new policy approach.



No Net Loss means that the overall water storage capacity within a watershed will not be diminished. It is an approach that allows for necessary drainage but also requires retention so the overall impact of human activities is net neutral.

The Manitoba government, with the assistance of the Manitoba Habitat Heritage Corporation, has also developed a wetland assessment tool that can be used to consistently assess the ecological functions that wetlands provide to ensure that highly functioning wetlands are protected.

Agriculture and Land Use

The relationship between water and land is closely intertwined. Agricultural or municipal development land use decisions can straddle watersheds, impacting more than one watershed.

The type of agricultural practices and community development decisions we take as Manitobans can enhance our watersheds or hasten their degradation. Being informed about what are the best management practices helps all of us to protect our waters. Adopting beneficial management practices that maintain the health and viability of our watersheds is not only beneficial to the health of Manitobans and the environment but to our economy.

The following initiatives are currently being considered to support the Agriculture and Land Use keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Growing Outcomes for Watersheds (GROW)

Manitoba will implement a Made-in-Manitoba ecological goods and services program called GROW, based on the Alternative Land Use Services (ALUS) model. This new program aims to reduce flooding and improve water quality and nutrient management. It will be delivered in partnership with landowners, non-government organizations and federal and municipal governments. Projects implemented through GROW will help foster adaptation to climate change and improve watershed resiliency to climate-related impacts, such as flooding and drought.

GROW will also recognize the value of green infrastructure to contribute multiple ecological goods and services, while protecting Manitoba's other infrastructure from a changing climate.

Conservation districts illustrate an important partnership between the province and local municipalities to protect, restore and manage land and water resources on a watershed basis. Naturally, conservation districts will be a key partner in delivering GROW — Manitoba's ecological goods and services program.

Considerations on this approach will commence shortly.

Drainage and Water Retention

Tile drainage can help to manage water on agricultural land more effectively than other approaches by increasing sub-surface holding capacity. Benefits need to be balanced by mitigation for potential negative impacts on downstream flooding and water quality. As part of work on a new regulatory approach to drainage, consideration will be given to reduce barriers to tile application and to mitigation requirements to reduce negative impacts.

Water retention can achieve multiple benefits to agricultural landowners and communities in managing the impacts of drought and mitigating downstream flooding or nutrient runoff. Innovative approaches will be considered through farm-based and community planning and water retention structure approaches to fulfill no-net-loss of water retention capacity goals.

Flood and Drought

Manitoba can experience both flood and drought in the same year. These events are hard on Manitobans and on our economy. Since the droughts of the 1930s, the flood of 1950 and especially after the 1997 flood, and even the 2011 and 2014 floods, Manitoba has been increasing efforts to be prepared for such events through better forecasting, monitoring, response planning and infrastructure. Going forward, we need to become even more innovative and support the development of multi-purpose, multi-scale retention systems that allow water to be stored on the landscape, thereby reducing local flooding, and also providing extra water that can be distributed during times of drought. We also need to incorporate green infrastructure ideas that help increase resiliency to climate impacts, such as bio filters on sewage lagoons or flood water retention ponds to assist with irrigation during droughts.

The following initiatives are currently being considered to support the flood and drought keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

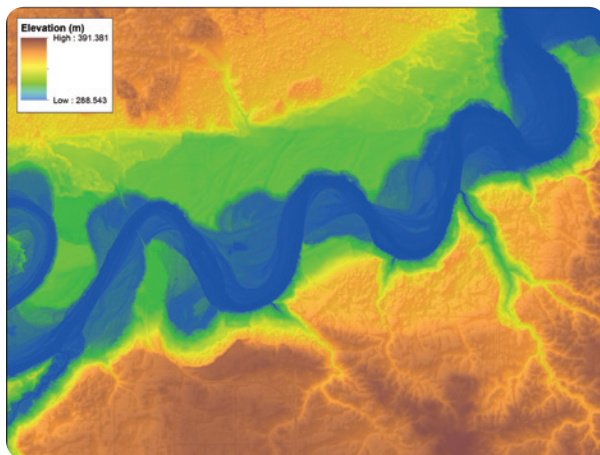
No Net Loss

As part of the integrated approach to watershed management, the Manitoba government has committed to a no net loss approach to water retention in watersheds. Keeping water on the landscape and managing it carefully assists our communities in being more resilient to a changing climate, including through flood and drought. Retaining water can also help to improve water quality.

Wetlands are a key part of Manitoba's water retention strategy. Also, through the integrated watershed planning process, the Manitoba government will conduct distributed storage studies to assist the agricultural sector, community decision makers, government and others in determining where and how to construct water retention structures for maximum benefit relative to cost. A pilot project has just been completed on the Roseau River watershed that identifies and analyzes 10 possible water retention projects.

LiDAR

LiDAR (Light Detection and Ranging) is a remote sensing technology which uses lasers to collect accurate, continuous elevation data, known as topographic data, over relatively large areas.



LiDAR data are used as a critical input to land and water management, including for flood risk mapping, delineation of watersheds and sub-watersheds, hydrologic modelling, water control infrastructure planning, flood mitigation and flood control infrastructure planning, water retention studies and land use planning. Manitoba will continue to leverage partners to complete LiDAR data collection for rural Manitoba.

LiDAR stands for "Light Detection and Ranging". It is a tool that uses laser sensors mounted on aircraft to create highly accurate elevation maps of the terrain.

Drought Defense

Drought has historically been the most costly of climate impacts on the Prairie economy. It is slow in its onset, but it can continue for long periods of time over widespread areas. It spirals through our economy from those who are first affected, such as farmers, then to equipment dealers to agricultural service businesses. The environmental impacts on land, water, fish and wildlife are also high, as can be the social and mental health impacts.

Understanding water availability and drought conditions and communicating them so people can make informed decisions is important. Expanded distribution of drought and water supply conditions information, including increased accessibility of up-to-date information through the Manitoba Drought Monitor website, helps to keep Manitobans informed and supports any required actions. Along with scientific monitoring, local and traditional knowledge needs to be incorporated to have a better understanding of the resiliency of the landscape affected. To increase collaboration and information sharing, Manitoba will establish and work with drought committees, including establishing regional drought committees to provide timely feedback from those out on the landscape.

The best way to protect Manitoba from the harsh impacts of drought is preparedness. Increasing the understanding of watershed and basin capacity and building preparedness through a variety of methods will help reduce the impacts of drought. A basin-by-basin approach to assessing preparedness is underway in tandem with the integrated watershed management planning process.

Water Quality

Good quality water that supports aquatic life, recreation, human consumption, agriculture, industry and many other uses is our expectation as Canadians. Unfortunately, water quality can be stressed by everyday activities and practices of people, communities and industry. That's why the Manitoba government is working with municipalities, farmers, business leaders and Manitobans to take action to protect our water quality.

The following initiatives are currently being considered to support the Water Quality keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government.

Please consider sharing your views online at:
www.manitobaclimategreenplan.ca.

Managing Excess Nutrients

Excess nutrients contribute to algae blooms in Manitoba's rivers and lakes. Algae blooms spoil drinking water, ruin beaches, lower property values, and damage fish and other aquatic life. Some algae produce toxins that can be dangerous to people, livestock and pets.

Algal blooms occur not only on Lake Winnipeg, one of Manitoba's greatest freshwater resources, but also on other lakes across Manitoba, including Killarney and Pelican Lakes, lakes in the Whiteshell Provincial Park, and others.

Algal blooms have a negative effect on our economy by decreasing tourism and over time, may reduce the productivity of commercial and recreational fisheries. Climate change will likely increase the frequency and severity of algal blooms when warmer temperatures contribute to longer ice-free seasons and warmer water temperatures.

Action to reduce nutrient loading to rivers and lakes will continue with increased focus on developing and implementing watershed-based targets for nutrient reduction, including for the Lake Winnipeg watershed.

Communities are important contributors to nutrient loading through wastewater treatment plants. Action to reduce nutrient loading through improved wastewater treatment, including implementing innovative solutions, will continue. Additionally, wetland protection commitments can go a long way to reduce nutrient loading off agricultural land.

Agriculture is a key land use in southern Manitoba. Manitoba will work with Keystone Agricultural Producers, conservation districts and other partners to implement beneficial management practices such as precision agriculture and those in the 4R program (Right time, Right amount, Right place, Right source) to help reduce nutrient loading.

What is Precision Agriculture?

Precision agriculture is about doing the right thing, in the right place, in the right way, at the right time, using new technologies, such as global positioning (GPS), sensors, satellites or aerial images, and geographic information systems (GIS) to assess and understand landscape variations. Precision agriculture allows for flexible application of inputs across fields and reduces the risk of over application.

An example of precision agriculture is variable rate fertilizer application, which allows a producer to:

- automatically deliver targeted rates of fertilizer to meet crop requirements.
- reduces the risk of over-application and overlap and improves fuel efficiency.
- improve efficiency of fertilizer applied.
- identify and adjust for environmentally sensitive areas.
- reduce the potential for non-point source pollution.



Water Quality Trading

An innovative method to improve water quality is through water quality trading. This applies a market-based approach that works alongside water quality regulation to improve water quality. Generally, a regulator sets an overall limit and allocates amounts of pollution or excess nutrient sources so the limit is not violated. The exceeding entities can then trade amongst themselves to meet the overall limits in the most effective manner. This means that a facility facing high related treatment costs can purchase equivalent reduction requirements from other sources at lower costs. For example, municipalities that are facing wastewater plant treatment upgrade costs to limit nutrient discharge could purchase credits from landowners who are willing to hold nutrients on their land through programs like GROW.

The Manitoba government will consider whether an innovative approach like water quality trading can improve nutrient reduction while supporting economic development.

Groundwater and Aquifers

Manitobans rely not only on high quality water in rivers and lakes but also below ground, in groundwater. Groundwater is used for irrigation, including for potatoes, livestock watering, food processing, horticulture, heating and cooling homes through geothermal installations, and providing drinking water to individual homes and communities. For example, up to 190,000 individuals rely upon between 50,000 and 80,000 private wells that supply water for domestic use to individual households. More than 200,000 people rely on groundwater-based municipal-public systems.

Precipitation and snow melt that recharges groundwater results in lower runoff and reduced flood potential. This water can be later discharged to springs and seeps, which provides baseflow to rivers, streams and wetlands during drier periods.

Recharge: All water that infiltrates the ground and enters the groundwater zone below the water table.

Runoff: Water from rainfall or snowmelt that flows across the ground surface instead of infiltrating the ground.

Baseflow: The portion of stream flow that is not runoff and results from seepage of groundwater. This is the primary source of running water in a stream during dry weather.

Groundwater is less susceptible to short and medium term droughts than surface water supplies. It creates resiliency in water supply from the variation in the amount and timing of precipitation and seasonal melt.

Recognizing the importance of groundwater, Manitoba will ensure that watershed management planning includes measures to protect groundwater and recharge areas. In areas where use of groundwater in a specific aquifer requires additional planning and management, aquifer management planning will be considered by working with all stakeholders. Groundwater mapping will be improved including, identifying flowing well areas and water quality concerns. These products are also important input to watershed, aquifer and basin planning.

Shoreline Erosion

Land that lies alongside rivers, lakes, streams, ponds and even man-made ditches is called a riparian zone or shoreline. The trees and vegetation along these strips of land provide important habitat for many kinds of wildlife and can represent the last line of defense against pollutants moving from ground and water.

Shoreline erosion is a natural process that occurs with wind, rain and wave action and can be accelerated by storms and natural loss of vegetation and trees. It can also be accelerated by human activity such as building too close to the water's edge, inappropriate armouring of shorelines and removal of vegetation and trees.

Maintaining shorelines is essential to preserving and protecting personal property, public safety and water resources.

Development in these areas can contribute to slumping or increased erosion. Building setbacks from water bodies for buildings are important to reduce liabilities for property owners, municipalities and ultimately taxpayers. Changes to precipitation resulting from climate change can increase seasonal variation of water regimes. This can impact soils and how they respond to our water flows, leading to increased sedimentation that reduces water quality or decreased stability of banks that support infrastructure like roads.

In response, the Manitoba government is considering establishing provincial guidelines to protect against shoreline erosion.

Drinking Water Quality

Manitobans expect safe, good quality drinking water. The impacts of a changing climate can pose risks to both the availability and quality of our drinking water. The Manitoba government uses a multi-barrier approach to protect our drinking water, focusing on the entire system from source-to-tap. As part of the integrated watershed management planning process, local plant operators meet with conservation district staff, municipalities and provincial drinking water officers to identify potential risks to drinking water sources and identify actions that can be taken locally to mitigate or eliminate those risks. Drought preparedness assessments completed in tandem with enhanced watershed planning processes can help local watersheds to identify potential vulnerabilities for drinking water sources in their communities.



Manitoba's central location in North America provides us with a great diversity of ecosystems, from the Prairies in the south to the Arctic coastlines in the north. We have inherited our abundant and unique natural heritage from past generations, and we are responsible for maintaining it in the present, as well as bestowing it in good health to future generations. Ecosystems provide benefits that are indispensable to the health and well-being of people and communities. Manitoba will undertake a series of initiatives that preserve nature, while also mitigating and adapting to the impacts of climate change.

Parks and Protected Areas

Manitoba is blessed to have over four million hectares of land and water set aside in 90 provincial parks, often just a short trip from home. Lush boreal forests, perfect prairie parklands, intriguing historic sites, sandy beaches, pristine lakes and crystal streams are ready for you to visit any time of year.

Parks serve many functions — they are places where Manitobans work, live and play, as well as places of cultural significance to Indigenous people. They may be places where people go to hunt, fish, gather food or harvest traditional medicines. Natural spaces can positively contribute to the well-being of people who enjoy them. Parks also have a critical role in conserving our biodiversity, as home to thousands of Manitoba animal and plant species. The Manitoba government strives to balance the ecological, cultural and economic values that our parks have for its citizens.

The following initiatives are currently being considered to support the Parks and Protected Areas keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Provincial Parks System

The Manitoba government is committed to expanding and improving its parks system to meet the desire of all Manitobans wishing to appreciate nature and enjoy the outdoors, plus attract new visitors from neighbouring provinces, territories and states. New capital investments in campgrounds, water treatment facilities and recreation facilities would make our parks more attractive than ever to Manitobans and out-of-province visitors.



Recreational Trails

The Manitoba government works in partnership with Trails Manitoba and the National Trans Canada Trail (TCT) organization to support the development and promotion of a system of recreational trails across the province. Access to recreational trails encourages Manitobans to appreciate the natural environment and be more physically active, which supports both mental and physical health. In Manitoba, trails wind across the province through boreal shield, river-bottom forest, tall grass prairie, the Pembina Hills, western uplands and more. There are various types of trails and trail conditions throughout the province that are suitable for different types of activities. Recreational trails also encourage economic development and ecotourism.

Protected Areas Network

A network of protected areas that adequately represents all of Manitoba's natural regions plays an invaluable role in conserving biodiversity, ensuring healthy ecosystem functions are maintained, and providing resiliency in the fight against climate change. Whether it's a provincial park that sequesters carbon in its forests and peatlands, a wildlife management area that provides habitat to big game species, or an ecological reserve that contains bat caves and other unique features, protected areas all have a role to play in conserving nature.

Provincial Crown land is an important component of a network of protected areas; Crown land management ensures that lands provide natural habitat connectivity for wide-ranging species, store carbon, and maintain valuable ecological processes.

The province is reviewing its network of protected areas, working in partnership with local residents, indigenous groups, and stakeholders, to ensure that an adequate level of protection is achieved for the long-term viability of species and habitat.

What is a Protected Area?



Protected areas prohibit, through legal means, logging, mining (including aggregate extraction), and oil, petroleum, natural gas or hydroelectric development. Protected areas with this minimum level of protection still remain open for activities such as hunting, trapping or fishing. As well, protected areas respect First Nation's rights and agreements such as the Manitoba Treaty Land Entitlement Framework Agreement.

Areas that contain rare or sensitive habitats can be set aside as ecological reserves with greater restrictions on uses and activities so the natural region features for which they are set aside endure for future generations. National parks also have high levels of protection based on federal legislation, mandates and agreements. Similarly, private landowners using conservation agreements can protect their land to these levels of protection if they wish.

Other activities that significantly and adversely affect habitat are also excluded in certain circumstances. Activities such as intensive agriculture, and urban or major recreational developments are avoided when establishing protected areas.

Connecting with Nature

Manitobans have long had a strong emotional connection to the land. Whether camping, hiking, bird-watching, hunting, fishing or collecting medicinal plants, spending time outdoors is a great way to appreciate the beauty of our province and the need to protect and conserve it.

Some ways this could be promoted include:

Ecotourism

Manitoba has a wealth of ecotourism opportunities available for residents and visitors alike — from prairie birding trails, to boreal wildlife viewing opportunities, to northern adventures on the Hudson Bay coast. With enhanced funding for tourism now provided by the Manitoba government, prospects for ecotourism could grow.

Hunting and Outfitting

Hunting is an important means of managing wildlife populations, an important source of food and a long-standing tradition among many Manitoba families. Subsistence hunters depend on harvests of land and marine wildlife for food, as well as for cultural definition and social connection. The outfitting industry is a source of employment in northern communities, and provides both resident and non-resident hunters with hunting opportunities in beautiful natural locations.

Encouraging safe and sustainable hunting practices and traditions is part of making this both more secure and appealing to new generations of Manitobans.

Wild Species and Habitat

Manitoba's wild plants and animals, and the habitats on which they depend, face significant challenges from climate change, disease, invasive species and human activities. The Manitoba government will continue its efforts to maintain and enhance wild species and habitats through a series of initiatives.

The following are currently being considered to support the Wild Species and Habitat keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Wildlife Management

Manitoba's wildlife species, both plants and animals, are being impacted by climate change, as well as other human-induced changes. Big game species in particular are facing significant challenges. Additional resources could be provided to ensure that wildlife is protected and managed in a sustainable manner.

Actions under consideration to better manage wildlife include undertaking effective and innovative surveys of big game species (to better understand current population status and trends) and developing comprehensive harvest co-management strategies in consultation with First Nations, Métis and licensed hunters and anglers (to give local communities a greater voice and ensure long-term sustainability of our wildlife populations).

Supporting Angling and Sustainable Commercial Fisheries

Maintaining sustainable fisheries is critical for subsistence users, for recreational anglers, and for commercial fishers looking to meet consumer demand for sustainably harvested fish. Fisheries are managed through the use of quotas, mesh size of gill nets, fishing seasons and regulations on the number of fishers licensed. These tools allow fish populations and the industry to remain viable, and also ensure that the domestic needs of treaty and Aboriginal rights-based fishers and their communities are met.

Commercial fishing has been a valued industry in Manitoba for over 100 years, with annual sales of \$30 million, almost all of which is sold out of the country. While most commercial production comes from Lake Winnipeg and Lake Manitoba, several smaller lakes in southern and northern Manitoba are also fished.

Recreational angling has an economic value of over \$400 million, according to a Travel Manitoba study, and has province-wide economic impacts.

The Manitoba government will continue its efforts to ensure that its fisheries are sustainable, and will develop a credible strategy to secure certification of Manitoba's commercial fisheries to meet demands for sustainably harvested fish.

Species at Risk

While most plant and animal species are abundant and healthy in Manitoba, a growing number of species have declined over time to the point of needing special protection. At present, species that have been designated at risk under provincial legislation include polar bear and boreal woodland caribou in the north, and several plant and animal species that make their home in prairie grasslands.

Manitoba is committed to supporting efforts to conserve species at risk, working collaboratively with landowners, non-government conservation organizations, Indigenous peoples, the federal government and other provinces and territories, to assess, monitor, protect and recover these vulnerable species.

Controlling Invasive Species

Invasive species are species that have been introduced into new ecosystems. They are able to spread rapidly because of their high reproductive rates and the absence of natural predators, competitors or diseases. In North America, species such as zebra mussels, invasive carp, leafy spurge and emerald ash borer are expanding their ranges due to human activity and climate change. Invasive species can have negative economic, social, environmental and human health implications. Control or eradication is very difficult.



Some invasive species carry disease, pose a powerful trigger for hay fever and other allergies, transform green spaces and water bodies, and change landscapes used by humans. Indirect effects could include:

- infestation of ecosystems rendering them less able to provide important ecosystem services that support human activity
- crop devastation
- disturbance of aquatic life and therefore the healthy contributions of plants and fauna to aquatic ecosystems

Manitoba will continue the fight to keep new invasive species from becoming established — and to keep those that are already here from spreading — through collaboration with neighbouring jurisdictions, awareness campaigns and aggressive control measures. We have already had success in managing invasive carp at Delta Marsh.

Forests and Natural Areas

Although Manitoba is considered a Prairie province, about half of Manitoba's land base is forested. Manitoba's boreal region, the province's single largest ecosystem, is a highly diverse landscape, made up not only of forests and grasslands, but also of enormous quantities of fresh water in lakes, rivers and wetlands. Boreal wetlands are critically important components of the boreal region, serving as natural water purification and storage systems, and as carbon sinks that mitigate the effects of climate change.

In addition to providing habitat for biodiversity, forests and natural areas are home to thousands of Manitobans who make their living from the land and resources in these areas. Careful balancing of these interests is required to ensure that all sustainable development principles and practices are followed.

The following initiatives are currently being considered to support the Forests and Natural Areas keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Forest Vulnerability Assessment

Manitoba's forests face many risks under a changing climate, such as increased damage from fires, insects, droughts or reforestation failures. To prepare and adapt, Manitoba has tested a Climate Change Vulnerability Assessment framework in some forests of the province. Completing further assessments will identify possible vulnerabilities, but more importantly it will identify potential solutions to ensure our forests stay resilient to a changing climate.

Shelterbelts and Afforestation

A shelterbelt is a plantation pattern usually made up of one or more rows of trees or shrubs planted in such a manner as to provide shelter and reduce wind speed up to a distance of 20 times the height of the shelterbelt, reducing the effects of erosion in times of drought. Roadside shelterbelts (less than 30 metres from the road) trap blowing snow and reduce the possibility of blizzard-like conditions. This creates safer winter driving and significantly reduces the burden of road maintenance. Shelterbelts with a variety of tree and shrub species provide habitat for birds and other animals.

A riparian vegetation buffer can stabilize eroding banks or shorelines of adjacent water bodies, provide physical separation of agricultural activities from sensitive aquatic areas, protect water quality by acting as an organic filter, supply diverse food and cover for upland wildlife, and improve aquatic and terrestrial habitats for fish, wildlife and other organisms. They also serve as carbon sinks, to mitigate the effects of climate change.

The Manitoba government is considering options for investing in shelterbelt and afforestation programming to increase the planting of trees as shelterbelts in rural Manitoba and adjacent to major transportation corridors. We intend to work with conservation districts and other important stakeholder groups to enhance our existing approach.

Wildfire Prevention and Preparedness

Manitoba's changing climate is expected to produce more extreme weather events, including prolonged periods of drought and more severe thunderstorms, both of which would increase the frequency and severity of wildfires.

Enhancements to the Manitoba Wildfire Program are under consideration to better prevent and prepare for extreme fires like Alberta's 2016 Fort McMurray fire, which can seriously threaten human life and property. These could include implementing new technology, improving deployment of equipment and personnel, increasing public awareness of fire and smoke-related risks to safety and health, and developing mitigation measures to reduce the risks that fires pose to human safety and property.



Carbon Sequestration

Manitoba's forested and agricultural landscapes are not only important as wildlife habitat and sources of natural resources, but are also significant sinks that are able to sequester carbon and help prevent damaging levels of CO₂ concentrations in the atmosphere that cause climate change. In a low-carbon world, this brings added value and importance to protecting these areas and managing them to secure this growing benefit. Wetland and grassland conservation, rotational grazing, cover crops, and zero-till farming practices are good for soil health and climate resilience. This is all part of sustainable agricultural and forestry practice that contribute significantly to carbon sequestration in the province.

Soil carbon benchmarking and monitoring would be a useful first step in assessing the potential and value for more carbon sequestration. Analyzing the impacts of current and prospective land development activities is also needed. Manitoba currently utilizes many planning tools, including carbon account models, when assessing the impact of potential developments on Crown land forests.

On private and Crown lands, woodlot management plans enable private land holders to set out management practices for their wooded and forested land in rural Manitoba in ways that balance conservation and economic development. Woodlot management plans could be modified to strengthen the focus on carbon sequestration and enhance measures for conservation, economic development and sequestration on both private and Crown forested lands.

Manitoba's potential sequestration level has been estimated by IISD at over 3 MT per year, 20 to 30 years from now. This would grow over time through a range of measures including wetlands, forestry, riparian buffers, minimum tillage, perennials, and cover crops.

Conservation

Conserving our environment and creating economic prosperity is at the heart of sustainable development. While we recognize the need to protect lands in perpetuity, we must also consider ways to use our natural resources to create jobs and prosperity. Manitobans understand both the importance of jobs and the obligation to maintain our natural heritage for future generations.

The following initiatives are currently being considered to support the Conservation keystone. Your comments, ideas and suggestions related to this keystone and its proposed initiatives are valuable to government. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.

Boreal Wetlands Conservation Policy

All wetlands in Manitoba are important. However, boreal wetlands in Manitoba are often undervalued and unrecognized. Similar to legislated requirements to identify and protect provincially significant peatlands, there is a need for a unified policy approach that is inclusive of these important boreal assets and the valuable ecosystem, economic and societal benefits they provide, both locally and globally.

Development of a boreal wetlands conservation policy is an opportunity for Manitoba to show leadership in boreal wetland conservation and stewardship. In doing so, we must recognize the importance of the forestry, mining, peat harvesting, and infrastructure sectors to Manitoba's ongoing prosperity. We must always strive to strike a balance that conserves these wetlands without hindering ongoing and future economic opportunities.

A proposed boreal wetlands policy could be developed through public, industry and stakeholder engagement and education. The development of best management practices and a commitment to a no-net-loss approach for boreal wetlands could be cornerstones of the policy. Northern and other regional communities, Indigenous communities and resource management boards would be actively engaged to assist in developing our approach.

Value of Boreal Wetlands to Manitoba



Greater than 80 per cent of Manitoba's land base falls within the boreal zone. Of this, boreal wetlands comprise over 40 per cent of Manitoba's boreal zone and cover over 220,000 square kilometres. More than 75 per cent of the total inflow of water to Lake Winnipeg in Manitoba comes from the boreal zone. The Boreal Wetlands Conservation Policy will assist in mitigating the occurrence of nutrient loading from the boreal zone to Lake Winnipeg (and other water bodies), while providing for the continued sustainable development of Manitoba's boreal zone.

Best Management Practices

The development of best management practices (BMPs) for sustainable resource development in Manitoba's boreal zone could be developed through public, industry, Indigenous, and stakeholder engagement and education. An example could be the development of BMPs for the construction, operation, decommissioning and reclamation of resource roads and water and wetland crossings on Crown lands.

Conservation Trust

A conservation trust has the potential to provide significant financial support to efforts aimed at achieving the goals and objectives of our provincial climate strategy, particularly those related to conserving nature. Providing funding to Manitoba communities and community groups, non-government conservation organizations and academic institutions would allow for funds and resources to be leveraged from within and outside the province to generate real action on the ground. Experiences in other jurisdictions suggest that the multiplication factor may be up to three times the initial investment in terms of overall value. Dedicating a portion of ongoing carbon revenue, for example, could allow for stable funding of the trust.

Manitoba will review successful conservation trust programs in North America and beyond in consideration of establishing a similar program in Manitoba.

Implementation

IMPLEMENTATION

Expert
Advisory
Commission

Carbon
Savings
Account

Sectors &
Communities

Measuring
Results

Too often, governments come up with plans that neglect the critical aspect of how they can be successfully implemented. This leads to cynicism and failure. We want to build implementation directly into the plan from the outset, and measure our progress as we go along and adjust as required. That's why Implementation is explicitly set out as part of the overall strategic framework in four key areas.

Expert Advisory Commission

This plan is part of a whole-of-government approach and, indeed, a whole-of-society effort. We must strive always to assess where we are, adapt to changing circumstances, and keep ourselves on track to a sustainable future. Ensuring ongoing input from knowledgeable and committed Manitobans will help us do just that.

To this end, the Manitoba government is proposing to create an "expert advisory commission" with an independent mandate to review our collective progress on the Climate and Green Plan, assist with its implementation and give needed advice on next steps. This commission should be formed from experts and stakeholders representative of the sustainable development community, namely: business, environment, sectors, Indigenous and other communities, and academe.

Bringing expert and committed Manitobans together ensures we have an ongoing Made-in-Manitoba solution.

Carbon Savings Accounts

Governments all over the country have set and failed to meet carbon reduction targets, contributing to frustration and cynicism about their intentions. Such targets are typically set far off in the future and the commitment needed to achieve those goals just hasn't been there.

Manitoba will take a different approach; one that fits our emissions profile, our early investments in clean hydroelectricity, and our Made-in-Manitoba carbon pricing and targeted emissions reductions model.

The goal must be actual, ongoing emissions reductions, not a false distant target never to be achieved. Part of this problem has been a rigid focus on a one-off GHG reduction target, rather than focusing on the stock of carbon pollution going into the atmosphere each year. It is these cumulative emissions that are stockpiling in the atmosphere and causing climate change. One year's reduction in emissions helps, but does little to alter long-term warming and climate impact trends we are experiencing. Our focus should therefore be on consistently reducing cumulative emissions over time. It is 'bending the emissions curve' once and for all. This is a more tangible, results-driven approach to tackling climate change that works. It is a focus that the United Nations Intergovernmental Panel on Climate Change (IPCC) and UK Climate Change Committee recognize:

"The idea of measuring climate change as a function of cumulative CO₂ emissions has emerged in the past five years as a simple and effective tool to understand and quantify how global temperatures respond to human emissions. In particular, the finding that climate warming responds linearly to cumulative carbon emissions is a powerful way to frame the climate problem, and opens avenues for both changing how we approach climate mitigation, as well as better predicting the climate impacts associated with a given emission pathway."

IPCC

"Furthermore, it is not simply the level of emissions in a future target year that we should be concerned about. It is cumulative emissions over the whole period that matter."

UK Climate Change Committee

What are Cumulative Emissions?



It is common to measure and report greenhouse gas (GHG) emissions on an annual basis. But given that many GHGs persist in our atmosphere for decades or even centuries it is very important to understand that such emissions have a cumulative impact on the climate. Globally, we are releasing more GHGs in the atmosphere than can be absorbed by natural systems. This builds up over time. An analogy is that of allowing a steady number of cars onto a bridge, but letting very few cars off on the other side. At some point, the cumulative weight is too much for the bridge. Thus, when developing policies to address GHG emissions, it is important to consider the impact of cumulative emissions, not just annual emissions.

This approach also has the added value of recognizing that economies grow and contract. As our economy grows, we must double-down on reducing emissions for which we are responsible and can reduce. As our economy contracts, we can monitor the amount of reductions required in response knowing we will make it up in the future.

Starting in 2018, Manitoba proposes to be the first province in Canada to establish a carbon savings account process with designated five-year carbon savings account periods. Each account period will be given a specific amount of cumulative emissions reductions to achieve. A debit measure will be taken at the close of each period to be applied to the subsequent carbon savings account period to make up any shortfall. Any shortfall in emissions reductions from one carbon savings account period will be added on to the next period to be made up there. Each period will see accelerating reductions in carbon emissions ensuring the overall goal of ongoing emissions reductions is

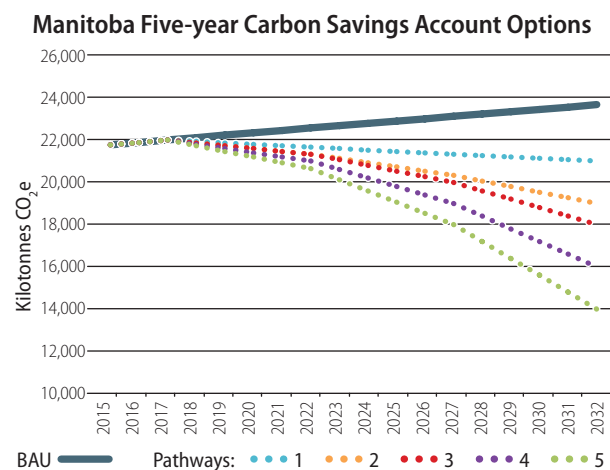
maintained. But these will be measured along the way so we can adjust and compensate, not at the end when it is too late to make up the difference.

Manitoba's first five-year carbon savings account will run from 2018-2022. Subsequent accounts will follow in 2023-2027 and 2028-2032. Government would set each five-year carbon savings account based on the National Inventory Report compiled by Environment and Climate Change Canada containing prior-year results and forecasts, as well as advice from the new Expert Advisory Commission.

Each carbon savings account period will see a reduction in emissions from what is projected. It will bend the carbon curve in a meaningful and effective way to make actual progress we can count. In the end, it will result in actual emissions reductions that can be measured and contribute to Canada's overall climate goals.

Each year, Manitoba's carbon savings account would ensure we are emitting less and less carbon pollution into the atmosphere from business as usual (BAU).

Here's an illustrative example of how it would work:



Total Cumulative Emissions Reductions (CER) Under Various Pathway Options

| Carbon Savings Account Pathway | Carbon Savings Account | 2032 emissions | % Change from Business as Usual (BAU) | CER over 15-year period from BAU |
|--------------------------------|------------------------|----------------|---------------------------------------|----------------------------------|
| 1 | 1 MT-1MT-1MT | 20.95 MT | -11.3% | -21.5 MT |
| 2 | 2MT-3MT-4MT | 18.95 MT | -19.8% | -34.2 MT |
| 3 | 2MT-4MT-6MT | 17.95 MT | -24.0% | -38.8 MT |
| 4 | 3MT-6MT-9MT | 15.95 MT | -32.5% | -51.5 MT |
| 5 | 4MT-8MT-12MT | 13.95 MT | -40.9% | -64.2 MT |

Sectors and Communities

Sectors and communities across Manitoba have a key role to play in our proposed Climate and Green Plan. All have a vital contribution to make in reducing emissions and helping Manitoba become more sustainable.

For the key emissions and industrial sectors in Manitoba, our approach will bring them directly into the decision-making process through ground-up participation. As part of developing and implementing five-year carbon savings accounts, sectors will be brought together through Manitoba Sustainable Development and the Expert Advisory Commission to consider what steps can be taken to develop individual sector plans and reduce emissions. Together, these will be “rolled up” as part of determining each carbon savings account target. That way, Manitoba’s emission reductions will be based on actual achievable goals.

Communities have a critical role to play in achieving the goals of this plan. Communities are the place where we live, work, raise families and engage with others. They are also the places where the impacts of climate change are most felt and decisions are most immediate and effective. Local action and sustainability decision making makes sense for a whole lot of reasons. Local communities can have a better understanding about what needs to be done and how best it can be done. Local solutions add up to bigger results as communities learn and engage with each other. And local decision-making can be more effective and less costly than through big government programs. We will take a community-based approach in many aspects of this overall plan.

The City of Winnipeg is developing its own climate change action plan. The Partnership for the Manitoba Capital Region is engaging in this issue at the local community level. Integrating and coordinating measures across provincial, city and community plans would lead to greater results for everyone.

For all Manitobans, regardless of which community they live in, acting sustainably is about lifestyle choices. Manitoba’s climate and green plan must involve all of

us. We can, with the right information and the right incentives, make good choices for the environment every day. This is everybody’s business — not just government’s, or industries’, or a few committed Manitobans. We all eat, play, move, use water and resources, and create waste. There is always a greener choice to consider in our everyday actions.

Not-for-profit agencies are important contributors to local and provincial action on sustainability and climate change. They work with municipalities to help develop climate adaptation plans. They work with schools and the public on climate change and sustainability education. They are an important and cost-effective resource that we can utilize more as part of this Climate and Green Plan. This plan envisages doing just that.

Together, we can all help ensure that Manitoba is Canada’s cleanest, greenest and most climate-resilient province. This is what we all want for Manitoba and Manitobans.

Measuring Results

Spending public money must lead to measurable results. And getting results requires measuring progress along the way. The Climate and Green Plan proposes to establish a series of key indicators for each of the 16 keystones to help guide our progress.

Manitobans need to see, especially with carbon pricing, that emissions reductions will occur and that public investments in water, nature, and infrastructure can lead to tangible sustainability outcomes including growth and jobs.

The pillars, keystones and proposed actions and initiatives in this Climate and Green Plan will help us achieve our vision of a clean, green and climate-resilient province. Here are some of the measures that we are contemplating as indicators of progress towards this vision. Your comments, ideas and suggestions on these proposed indicators are valuable to government. They will be taken into account when deciding on the final list of indicators. Please consider sharing your views online at: www.manitobaclimategreenplan.ca.



Clean Energy

EXPECTED RESULT:

- More clean energy use in Manitoba

POSSIBLE INDICATORS:

- Manitoba's annual fossil fuel consumption, as indicated by petajoules consumed (total or per capita basis)
- annual total or per capita natural gas consumption
- health related indicators, such as:
 - reduction in incidence of vector-borne diseases
 - reduction in reported cases or air-quality related cardio-respiratory illnesses



Carbon Pricing

EXPECTED RESULT:

- Emissions reductions due to carbon pricing

POSSIBLE INDICATORS:

- reduction of reported emissions in Manitoba attributable to the carbon price, as indicated by litres of gasoline and diesel sold annually
- ratio of Manitoba's GDP to annual total litres of gasoline and diesel consumed
- annual increase in adoption of alternatives (e.g., ratio of gasoline to electric vehicles purchased)
- economic competitiveness impacts by sector such as exports



Sector Emissions Reductions

EXPECTED RESULT:

- Overall emissions reductions for Manitoba and in identified sectors

POSSIBLE INDICATORS:

- Manitoba's annual total CO₂e emitted
- Manitoba's annual per capita CO₂e emitted
- specific sector emissions reductions
- Manitoba government emissions footprint
- amount of CO₂ sequestered



Adaptation

EXPECTED RESULT:

- Increased climate resiliency in Manitoba

POSSIBLE INDICATORS:

- number of local governments with climate adaptation plans
- number of local governments with emergency management programs in place
- number of communities with emergency preparedness/response plans
- number of local governments with drought and flood structures in place
- a measure of prevented loss in dollar terms, as indicated by a ratio between dollars spent on adaptation initiatives to dollars saved from responding to or compensating for climate-related impacts
- dollars invested in green infrastructure project aimed at increasing protection against climate impacts
- number or percentage of provincial infrastructure projects designed with climate resiliency considerations



Innovation and Cleantech

EXPECTED RESULT:

- Growth in the clean technology sector

POSSIBLE INDICATORS:

- ratio of Manitoba's GDP to annual total GHG emissions (CO₂e/GDP)
- change in total revenues from the environmental and cleantech sector
- number of jobs and firms in the environmental and cleantech sector



Financing and Investment

EXPECTED RESULT:

- Increased private sector investment in the green economy

POSSIBLE INDICATORS:

- amount of private sector dollars invested in clean technology
- number of cleantech and environmental services firms accessing financing capital
- number of start-ups in this sector
- green tape reductions



Skills and Training

EXPECTED RESULT:

- Increase in green economy jobs

POSSIBLE INDICATORS:

- change in overall employment numbers
- increase in employment numbers by specific sector and industry
- number of environmental professionals and employees
- increase in available green job openings
- new educational programs offered at post-secondary training institutions
- enrolment in environmental-related courses and programs



Green Infrastructure

EXPECTED RESULT:

- More green infrastructure projects

POSSIBLE INDICATORS:

- change in number of and dollars invested in green infrastructure projects
- ratio of green infrastructure projects to total infrastructure projects, by number or dollar amount
- number of projects that use natural solutions such as bio-filters on sewage lagoons
- number of private and public projects that have eco-certification or forecasted climate change scenarios incorporated into design



Agriculture and Land Use

EXPECTED RESULT:

- Maintenance and enhancement of our healthy agro-ecosystem

POSSIBLE INDICATORS:

- production of agriculture products in concert with ecological goods and services
- hectares of natural capital (e.g., wetlands, riparian areas, grasslands, woodlands), conserved, restored and improved
- number and type of BMP implemented by watershed
- soil health
- environmental farm plans created or renewed



Watersheds and Wetlands

EXPECTED RESULT:

- Healthy and sustainable wetlands and watersheds

POSSIBLE INDICATORS:

- hectares of wetlands inventoried in Manitoba
- hectares of restored wetlands in rural Manitoba
- number of watershed plans create or renewed
- ratio of watersheds with watershed plans versus watersheds without watershed plans
- number of watershed-based distributed water retention studies completed
- number of acres (or percentage) of LiDAR capture across Manitoba
- acre-feet of water stored



Flood and Drought

EXPECTED RESULT:

- Effective forecasting, mitigation, and response to flooding and drought

POSSIBLE INDICATORS:

- number of watershed-based drought preparedness assessments completed
- number of water control structures used to enhance landscape features and manage water (volume of water stored or diverted)
- number of flood and drought-related calls to crisis lines
- proportion of at-risk communities with ring-dike protections
- proportion of regional health authorities and municipalities with flood and drought plans in place
- full cost of resources provided by Manitoba government to assist Manitobans during events
- number of communities protected to the design flood protection level (FPL)
- flood damages avoided through operation of water control structures
- reduction in agricultural losses to flooding (measured through Agri Insurance claims)
- reduction in private, municipal and provincial disaster financial assistance claims



Water Quality

EXPECTED RESULT:

- Clean water throughout Manitoba for drinking, habitat, recreation, and economic development

POSSIBLE INDICATORS:

- Manitoba's Water Quality Index, as published by the Canadian Council of Ministers of the Environment
- number of Manitoba communities under a boil water advisory that persist for more than one month
- number of watershed-based targets for nutrient reduction in place
- number of farms (or acres) using 4R practices for nutrient management
- number of wastewater treatment facilities with nutrient removal
- number of waterborne illness outbreaks
- number of recreational water exceedances



Parks and Protected Areas

EXPECTED RESULT:

- Manitoba families who enjoy a greater connection with nature and natural tourism

POSSIBLE INDICATORS:

- number of visitors to Manitoba's provincial parks, as indicated by the number of park passes sold
- annual economic value of ecotourism, hunting and outfitting



Wild Species and Habitat

EXPECTED RESULT:

- Healthy wildlife populations and biodiverse ecosystems

POSSIBLE INDICATORS:

- the population of (selected species e.g., moose, caribou, wolf, etc.) in Manitoba
- number of species listed at risk in Manitoba
- number of invasive species currently being tracked (under legislation, or with active control measures in place)
- the status of fish stocks as measured by comparing the commercial production of the most economically valuable fish species against maximum sustainable yield (MSY)



Forests and Natural Areas

EXPECTED RESULT:

- Healthy and productive forests and natural areas

POSSIBLE INDICATORS:

- amount of Crown forest and grassland cover in Manitoba
- annual number of trees planted (includes shelterbelts, reforestation, new forests)
- number of completed private woodlot management plans
- number of vulnerability assessments and forest management adaption plans completed



Conservation

EXPECTED RESULT:

- Manitoba support for active conservation efforts

POSSIBLE INDICATORS:

- number of hectares protected under conservation agreement or easement
- amount of restored habitat
- number of hectares of boreal wetlands conserved
- number of hectares in the boreal zone enhanced through Best Management Practices

Questions for Discussion

- What do you think about the proposed implementation elements?
- Which indicators do you think are best for measuring progress and results?

Projected Emissions Reductions

The table below outlines initial greenhouse gas mitigation initiatives the Manitoba government is considering to reduce greenhouse gas emissions in the province and the range of projected emissions reductions that could result.

| Initiative | Description | Estimated Cumulative Emissions Reductions (tonnes) 2018- 2022 |
|--|---|---|
| Carbon Price | Flat \$25 per tonne carbon price | 1,070,000 |
| 5% biodiesel mandate | All diesel sold at pumps in Manitoba would be required to contain at least 5% biodiesel content. | 360,000 – 431,000 |
| Efficiency MB | A new stand-alone agency to reduce electricity and natural gas consumption in the province through innovative products and programs, including green heating and green buildings. | 342,000 |
| Organics Diversion | Establishing an organics diversion target of 100,000 tonnes and adopting measures to support the waste diversion target. | 270,000 |
| Coal Phase Out | Phasing out Manitoba's last remaining coal unit ahead of schedule. | 45,000 – 187,500 |
| HD Truck Retrofits | A heavy-duty (HD) diesel truck retrofitting rebate program. | 150,000 |
| ODS Recovery | Implementing measures to optimize management of end-of-life white goods containing ozone depleting substances (ODS) and halocarbons. | 60,000 |
| Electric Buses | Replacing 100 diesel city buses with clean electric buses. | 47,000 |
| Low Carbon Government | Adopting measures to reduce emissions in government buildings, transportation, and waste streams. | 30,000 – 38,5000 |
| Agriculture Best Management Practices (BMP) | Supporting on-farm BMPs that reduce agriculture emissions. | 16,750 – 33,500 |
| Displacing Propane in Churchill | Displacing propane heating with electric heating in up to 200 Churchill homes. | 3,000 – 6,000 |
| TOTAL CUMULATIVE EMISSIONS REDUCTIONS (TONNES) | | 2,393,750 - 2,635,500 |
| TOTAL NON-PRICING CUMULATIVE EMISSIONS REDUCTIONS (TONNES) | | 1,323,750 - 1,565,500 |

These projections are estimates only and will be refined as part of each Carbon Savings Account process with more detailed modelling considering their interactive effects and other economic factors.

Moving Forward



As Minister of Manitoba Sustainable Development, I am pleased to seek the input of Manitobans into our proposed Climate and Green Plan. We want this to be a strong plan that works for Manitoba for many years ahead.

We have met with hundreds of Manitobans and dozens of organizations, businesses, and individuals to get us to this point. You have already helped shape this plan with your advice.

Now it is time for the government to present our proposed plan to all Manitobans and hear what you have to say.

Our plan has been written to allow you to offer your views as you read through it. Please go online to www.manitobaclimategreenplan.ca and give us your views and suggestions.

We will be meeting with environmental, business, community and civic society leaders and representatives to hear their thoughts on the plan.

Indigenous leaders and organizations will be invited to gain their very important perspective. The application of traditional and Indigenous knowledge can be a real boon to understanding and acting on environmental threats.

To maximize the input of as many Manitobans as possible, we have created a 'town hall kit' to assist you and friends in your community to offer your views. We want as many Manitobans as possible to have the chance to provide their suggestions.

Please let us know your views between now and November 30, 2017.

Strengthening Manitoba's environment and economy depends on all of us. Each of us has a role to play in growing our economy and protecting our environment.

Having a climate and green plan that works is 'job one' for a clean, green and climate-resilient Manitoba.

Please join us in making it happen.

Original signed by
Honourable Rochelle Squires

