



Manitoba's
Climate Change
and Green
Economy
Action Plan

December 2015

Manitoba 

A photograph of a hand holding a small evergreen sapling with its root ball in a nursery greenhouse. The greenhouse has a curved metal frame and a translucent covering. The background is filled with rows of similar saplings. The text is overlaid in the center of the image.

**"Climate change is the
defining global
environmental issue
of our time."**

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Premier's Message

Climate change is the defining global environmental issue of our time. The science around climate change is clear and conclusive. The world's climate is changing and human activities are rapidly accelerating this change. The time for action is now.

We all face the health, social and economic consequences associated with climate change. The financial and human toll of extreme events is already evident in Manitoba. The total cost of the 2011 flood to the Manitoba government alone is estimated at \$1.2 billion. At the peak of this flood 7,000 people were evacuated from their homes, causing significant social hardship and economic disruption. Since 1997, more than \$1 billion has been spent on flood mitigation efforts in Manitoba. To date, these flood protection works have prevented tens of billions of dollars in damages, not to mention avoiding disruption and personal hardship caused by flooding. While we recognize that we must adapt to protect people and property from flooding, we also recognize that there are social, environmental and economic benefits from doing so.

Take for example the responsible investments we have made in Manitoba Hydro, which furthers our social, environmental and economic objectives. Virtually all of our electricity is generated by non-emitting hydropower, with 5,200 megawatts of installed capacity and the potential to double this capacity in the future. Our domestic power is clean and renewable, and our exports reduce emissions in other jurisdictions in excess of six million tonnes annually, the equivalent of eliminating the emissions from 1.2 million vehicles, or 30 per cent of our total emissions every year. Over its 100-year life, the Keeyask Generating Station will release fewer emissions than a natural gas fired generation facility would release in half a year. If not for our clean-energy choice, Manitoba's emissions would be double our current levels.

We have introduced many actions to help create a sustainable, green and growing economy, including leading-edge energy efficiency programs, enhanced wind power and expanded geothermal installations. We have banned the use of coal for generating electricity and as a heating fuel, and we have directed coal tax revenues to biomass conversion. We fund one-half of public transit and have invested in active transportation. We helped create one of the world's first full-size, all-electric, battery-powered transit buses. We have taken substantial action to protect the boreal forest and areas of high ecological value, while leading the country in economic diversity and frequently in growth and employment.

Over 90,000 Manitobans already work in green jobs, more than the Canadian average. By addressing energy efficiency, renewable energy, waste reduction and water efficiencies, Manitoba will create tens of thousands of equitable, good jobs throughout the province and in various sectors. We estimate by implementing the measures in this plan, Manitoba will create at least 6,000 new green jobs by 2020.

Manitoba will enshrine environmental rights in legislation and be the first province to formally endorse the Blue Dot Campaign. This new legislation will be a foundation for everything we do and will set Manitoba on a new, greener path.

New actions to reduce carbon emissions must be delivered in an ambitious but sustainable way. I would like you to consider the measures outlined in the paper and engage in ongoing climate change discussions. Ultimately, shifting to a low-carbon society is about innovation, creating good jobs, growing the economy through climate-friendly investments, addressing climate risks and protecting the health and well-being of citizens. Addressing climate change means fostering the green economy, creating new export opportunities and investing in climate resilient infrastructure. Simply put, the benefits far outweigh the costs. I look forward to advancing our collective commitment to a resilient future for all Manitobans.

Original signed by
Premier Greg Selinger





Minister's Message

Our vision is of a province that is carbon neutral and builds on our rich renewable energy resources. We intend to build an economy that stimulates innovation, local investment and green jobs in all sectors. Our actions will be guided by the principles of social equality, fairness and reconciliation and ecological integrity.

As we approach the international climate change negotiations taking place in December 2015, the global community will establish a path forward for reducing emissions and adapting to climate change. The world has come to a common understanding that economic, environmental, social and health benefits will be realized by reducing greenhouse gas emissions. In Manitoba, we are experiencing the effects of climate change, and the urgency to act is as profound locally as it is globally. We recognize that we will benefit from coordinated actions that manage risks and multiply opportunities. In this newest climate change action plan, we have identified actions that will stimulate the economy to support our transition to a sustainable future.

Our objective is to address climate change while building a prosperous green economy that is resilient, low-carbon, socially equitable and environmentally sustainable. We will create more good green jobs that are local and stable. We will build on previous commitments, policies and programs that leverage investments and achieve multiple benefits.

Manitoba has a critical role to play in advancing global efforts to address the changing climate around us. We will build on our world class expertise to manage floods, droughts and water quality. We will continue to work towards eliminating costly and wasteful inefficiencies. We will enhance renewable energy and ecological goods and services to increase our natural, localized advantages.

I look forward to working together with Manitobans as we meet the challenges and opportunities of greening our economy to address climate change.

Original signed by
Honourable Thomas Nevakshonoff



**By 2030,
Manitoba will
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**By 2080,
Manitoba
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carbon neutral**

EXECUTIVE SUMMARY

Despite many years of debate around the validity of climate science, the science is clear: climate change is real, human activities are accelerating this change, and the impacts of climate change are being felt in Manitoba.

The window of opportunity to access northern communities using winter roads is shortening, our growing season is changing, and extreme weather events are straining our infrastructure and damaging our properties and natural landscapes. While some areas of the province have experienced tremendous flooding, others have experienced intense wildfires, often leading to displaced communities and lost livelihoods. As these events increase in frequency and in intensity, the financial costs will grow, as will the psychological and ecological stresses associated with these changes.

Conversations about climate change are occurring among many groups: health care providers, urban planners, farmers, engineers, Indigenous communities, non-profit agencies, schools, faith-based organization, community and business leaders, and among neighbours. These conversations reflect the reality that climate change will affect families and individuals, and acting on climate is everyone's responsibility.

WHY WE NEED TO ACT

Acting on climate change is an economic and environmental imperative for Manitoba. The case for reducing our greenhouse gas (GHG) emissions and preparing for the impacts of climate change becomes increasingly evident as the negative repercussions of the status quo become evident locally.

Manitoba has established itself as a green energy leader by producing 98 per cent of our electricity from renewable hydroelectricity. We know that more must be done. Our new Climate Change and Green Economy Action Plan outlines ways that we can reduce emissions from our homes and businesses, transportation, land-use and agriculture activities, and industrial operations. Our plan recognizes that the impacts of climate change are being felt now, and that we can implement practical strategies to GHG emissions and reduce our exposure to risks. By facilitating the shift to a low-carbon economy, we will provide employment and local development opportunities for communities throughout the province.

Reducing risk and planning for climate changes provides energy security and reduced energy costs, clean water and air, resilient ecosystems, innovation, green jobs, improved public health, food security, and economic stability.

We can avoid the future costs of climate disruption while helping to ensure a healthy environment and economy for future generations by acting now. Delaying action will make adaptation more difficult to address and more costly in the future.



OUR PLAN

Manitoba's new plan outlines ambitious and forward looking greenhouse gas reductions targets for our province. With the recent change in federal government and a renewed emphasis on climate change at the national level, we look forward to dialogue on climate change so that we can accelerate our activities and collectively work toward the goal of becoming a carbon-neutral province.

Manitoba is acting on the Public Utility Board's recommendation to establish a new independent Demand Side Management (DSM) entity to oversee provincial energy efficiency and conservation programs. The new entity will develop and deliver leading-edge programs to meet new legislated targets for electricity and natural gas savings.

Under our new plan, Manitoba is the first Canadian province to sign the Blue Dot Declaration promoted by the David Suzuki Foundation. To fulfill this commitment we will introduce new legislation that will ensure a healthy environment for all Manitobans.

Manitoba employers know how to innovate and are key partners in the shift to a low-carbon economy that is resilient to climate change. We will explore the use of innovative financing mechanisms such as green bonds, undertake a green tape review to remove barriers to new green technologies, and promote new investment opportunities in Manitoba's clean energy economy.

Our plan outlines projects that will be undertaken through our new five-year \$5 million Climate Change Action Fund. Funds will be invested across sectors so that we can continue to drive innovation in our transportation and agriculture sectors, assess local climate risks and develop solutions, expand climate change work on the ground by partnering with communities, and expand innovative energy projects in First Nations communities.

Our plan will look at how carbon pricing can be used as a tool to drive innovation and boost economic growth while reducing GHG emissions. Manitoba is committed to implementing a cap and trade program for large emitters and will look at other innovative measures, such as a made-in-Manitoba Carbon Stewardship model for sectors not covered by cap and trade. We will engage in an open dialogue on carbon pricing to explore a range of opportunities.

Under this plan, the Manitoba government will lead by example by reducing emissions from government operations through increased energy efficiency, emissions reductions from our vehicle fleet and equipment, greener office spaces, and waste reduction. We will provide a complete inventory of our own greenhouse gas emissions and develop a comprehensive policy framework so that we can become a carbon neutral government.

Our plan addresses key sectors such as buildings, transportation and agriculture with a clear focus on innovation in the shift to a low-carbon economy. Manitoba has demonstrated its leadership in its commitment to innovation with the development of new zero-emission battery electric transit buses and transformative research into new crops and natural bio-products.

The Green Economy and Green Jobs

The United Nations Environment Program (UNEP) 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.

UNEP defines green jobs as "...work in agriculture, industry, services and administration that contributes to preserving or restoring the quality of the environment. Green jobs are found in many sectors of the economy from energy supply to recycling and from agriculture and construction to transportation. They help to cut the consumption of energy, raw materials and water through high-efficiency strategies to de-carbonize the economy and reduce greenhouse gas emissions, to minimize or avoid altogether all forms of waste and pollution, to protect and restore ecosystems and biodiversity."



Minimizing risk and adapting to climate change are essential components of our new plan. We will monitor climate influenced vector-borne diseases, grow our capacity to manage and respond to extreme heat and weather events and support vulnerable populations. We will continue to invest in flood proofing infrastructure, enhance our firefighting and wildfire suppression efforts, enhance our northern transportation network, and identify best practices for building, maintaining and operating our infrastructure.

Our new plan will ensure that a framework for monitoring, reporting and evaluation is implemented to identify success factors and eliminate barriers. Manitoba will provide regular reports on its progress and will develop robust indicators to measure environmental protection, economic prosperity and social well-being.

Manitoba is already a low-carbon leader, and we are well positioned to become a leading low-carbon economy. We will continue to work with our provincial, regional, national and international partners to build on our strengths and address new opportunities in our need to reduce GHG emissions while focusing on prosperity, people, and our collective future.

MANITOBA'S VISION

Manitoba will address climate change by creating green jobs in all sectors, spurring technological innovation and focusing on adaptation measures in our pursuit of carbon neutrality. While promoting social equity and fairness, we will strengthen resiliency and adaptability, reduce greenhouse gas (GHG) emissions and work to avoid the most serious impacts of climate change.

Manitoba will adhere to the following principles as it transitions to a low-carbon economy:

- **Green Economic Growth**

Manitoba will create new green jobs and a sustainable economy.

- **Carbon Neutrality**

Manitoba will reduce its GHG emissions by one-third over 2005 levels by 2030, by one-half over 2005 levels by 2050 and will become carbon neutral by 2080.

- **Environmental Responsibility**

Manitoba will be environmentally responsible in all its actions and investments, and honour traditional ecological knowledge in its approaches.

- **Partnership**

Manitoba will form partnerships with communities, other governments and non-government organizations to find solutions to climate change.



CLIMATE CHANGE IMPACTS IN MANITOBA

In Manitoba, climate change has already been affecting our environment, our communities, and key sectors of the economy. Average temperatures in parts of Manitoba have increased by 1°C to 2°C in the past 60 years. By 2050, without reductions to our GHG emissions, Manitoba's temperatures could increase significantly across all seasons. The warming we have seen to date is projected to continue if no action is taken.

Precipitation patterns are also expected to change, with warmer and drier summers and more precipitation in winter and spring. There may be increased risk of water scarcity and more frequent and intense droughts, floods, and other extreme events. For the Prairies, this may lead to lower summer stream flows and notable shift in stream flow timing earlier in the year; falling lake levels; decreased ice cover periods; and decreased spring snow cover extents and soil moisture. Increased risk of flooding may cause public safety hazards, amplified soil erosion, increased infrastructure deterioration and decreased water quality.¹

The University of Winnipeg's Prairie Climate Atlas project used climate data output from state-of-the-art climate models to study the effects of a changing climate on Manitoba and the adjacent Prairie provinces. Preliminary research conducted by the University of Winnipeg suggests that by the 2020s, the summer climate of Winnipeg, Brandon, and other southern regions is very likely to be more like North Dakota's present climate. By the 2050s, the summer climate of Winnipeg will likely be more like Nebraska. By the 2080s, Winnipeg's summers may be more like present day Kansas and northern Texas, with much hotter conditions and a greater risk of drought and severe summer weather events.²

Overall, while a warming climate may present some opportunities, such as a longer growing season and fewer winter cold snaps, these changes will pose significant threats to Manitoba's natural habitats, infrastructure, food security, economy, communities and public health.

¹ Sauchyn, D. and Kulshreshtha, S (2009): Prairies; in *From Impacts to Adaptation: Canada in a Changing Climate 2007*, edited by D.S. Lemmen, F.J. Warren, J. Lacroix and E. Bush; Government of Canada, Ottawa, ON, pp. 275-328

² Blair, D. and Smith, R., 2015. *The Prairie Climate Atlas*. Accessed online at <http://climate.uwinnipeg.ca>, October 6, 2015.



WHAT COULD CLIMATE CHANGE MEAN FOR MANITOBA?

- Warmer temperatures will result in permafrost thawing, which will continue to cause northern roads, railways and other community infrastructure to buckle and deteriorate, all while reducing the winter road season.
- Seasonal changes in snow and sea ice conditions, along with ecosystem changes, will continue to affect access to traditional foods.
- Water levels in many lakes may not change dramatically. However, they could decline from a prolonged drought and related reductions in runoff, precipitation and increased evaporation. Warmer water will affect fish habitats and water quality in lakes and rivers.
- Woodland caribou, polar bear and moose could become endangered or extinct due to increased disease, habitat loss and fragmentation.
- Heat waves, drought, forest fires, pests, diseases (ex: Lyme disease) and other extreme events are likely to increase.
- In some parts of the boreal forest, there have already been record forest fires, pests and disease outbreaks and this is expected to increase in a future warmer climate.

ARE THERE POTENTIAL BENEFITS?

- The growing season could increase by 50 per cent, boosting agricultural productivity and the number of crops grown and enhancing tree growth and productivity in the forestry sector.
- Forest productivity could increase due to a warmer and longer growing season and increased CO₂ levels where soil, water and nutrients are not limiting.
- Warmer temperatures would lead to lower space heating bills and less cold winter stress for people, wildlife and livestock.
- Longer summers could benefit the tourism sector and lead to longer warm season recreation opportunities, such as camping and water-based activities.
- Increased economic opportunities in Churchill could be realized from a longer shipping season with the opening of the Northwest Passage in the Arctic.

Source: Lemmon, D.S. Johnson, M., Ste-Marie, C., and Pearce, T. (2014): *Natural Resources Canada; in Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*, (ed.). F.J. Warren and D.S. Lemmon; Government of Canada, Ottawa, ON, p. 65-98.

GREENHOUSE GAS REDUCTION TARGETS

Manitoba has historically taken significant steps to build a sustainable, low carbon economy. Ninety-eight per cent of our electricity generation comes from renewable hydro-electricity. If Manitoba had chosen thermal-generation of electricity, such as natural gas plants, Manitoba's emissions would be double our current levels. As part of the new action plan, Manitoba is committing to further reducing greenhouse gases with the following GHG reduction targets:

By 2030, Manitoba will reduce its greenhouse gas emissions by one-third over 2005 levels

By 2050, Manitoba will reduce its greenhouse gas emissions by one-half over 2005 levels

By 2080, Manitoba will be carbon neutral

Manitoba's emissions were approximately 20.7 megatonnes (MT) in 2005 and 21.4 MT in 2013. Reducing emissions by one-third over 2005 levels by 2030 will require 7.6 MT of GHG reductions, while absorbing any new emissions from population and economic growth. Manitoba can achieve these ambitious targets through the actions in the plan, by being innovative, investing in new technologies, growing green jobs and creating a sustainable economy. To achieve these goals, Manitoba will need the support and assistance of the Government of Canada. Manitoba has been working with other provinces and territories to reduce GHG emissions and welcomes the call from the federal government to work across jurisdictions to achieve ambitious national and sub-national goals.

The U.S. Clean Power Plan illustrates the economic benefits of reducing emissions. The U.S. Environmental Protection Agency estimates that net annual public health and climate-related benefits of the Clean Power Plan will be worth \$45 billion by 2030. Greater energy efficiency and cleaner power will result in an estimated average savings of \$84 per year for American families and businesses. The expected health benefits will include the following each year:

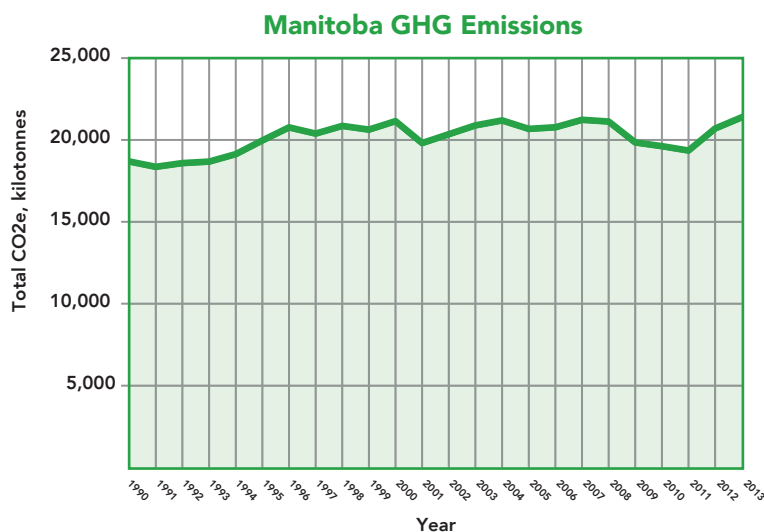
- 3,600 fewer premature deaths
- 90,000 fewer asthma attacks in children
- avoidance of 300,000 missed work and school days
- 1,700 fewer hospital admissions





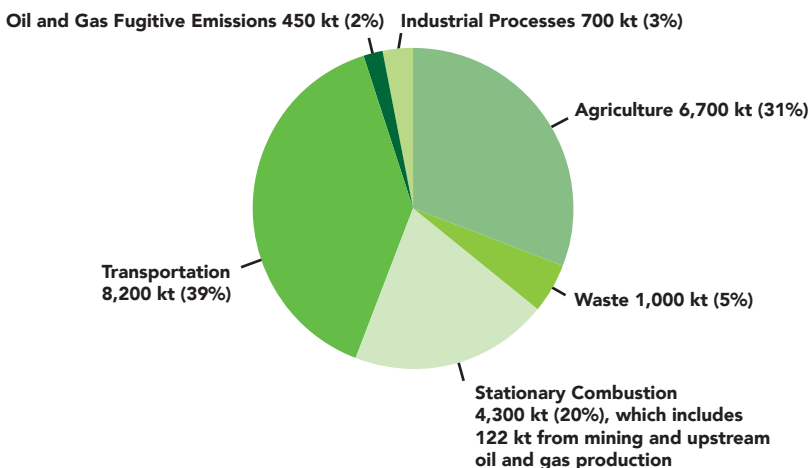
HOW DOES MANITOBA MEASURE UP?

Canada represents two per cent of the world's emissions and is among the top 10 emitters internationally. In 2013, Manitoba represented 3.6 per cent of Canada's population and about three per cent of national emissions. Between 1990 and 2013, Manitoba's total GHG emissions increased by 14.4 per cent, from 18.7 megatonnes (MT) to 21.4 MT CO₂e (carbon dioxide equivalent). This increase is the result of increases in emissions from the agriculture sector, on-road light duty gasoline trucks and heavy duty diesel vehicles and a 16.0 per cent population increase over the same period of time.



The use of fossil fuels for transportation, building heating and cooling, industrial process and agriculture represents the vast majority of Manitoba's GHG emissions.

Manitoba's Emissions by Sector (2013)



MANITOBA'S CLEAN ENERGY ADVANTAGE

The environmental benefits provided by hydro-generated electricity in Manitoba are substantial. From 1990 to 2013, a cumulative total of 430.1 MT of CO₂e has been saved by choosing hydro-electricity over fossil fuels. If Manitoba relied on fossil fuel generated electricity, GHG emissions associated with this sector would be double current levels.

Manitoba Hydro produces more hydro-electricity than Manitobans use domestically. This surplus is exported to the U.S. or to other jurisdictions within Canada. Manitoba Hydro exported an annual average of 7,283 gigawatt-hours (GWh) of hydro-electricity, displacing an average of 4.9 Mt of CO₂e annually in the U.S. from 1980 to 2013. Manitoba Hydro also exports a net average 1,590 GWh of hydro-electricity to other provinces annually, displacing an additional 1.1 MT of CO₂e outside our provincial borders each year. Located in Brandon, Manitoba Hydro's last remaining coal generating facility can only be used if emergency power is required. It is occasionally operated to ensure it will work in the event of an emergency. From 2005 to 2009, GHG emissions from this facility were approximately 400,000 tonnes per year; they are now less than 80,000 tonnes per year. This plant will stop using coal in 2019 when new hydro generating stations begin operating.

In addition to being renewable, Manitoba Hydro's activities create good green jobs. Manitoba Hydro development has been a key economic driver, while at the same time consumers enjoy some of the lowest rates for power in North America. In 2014, Manitoba Hydro earned \$439 million in revenue from electricity exports, had assets in service worth \$15.6 billion, and employed 6,556 people. In the same period \$34 million was invested in PowerSmart initiatives, while consumers saved \$112.9 million through the PowerSmart program.

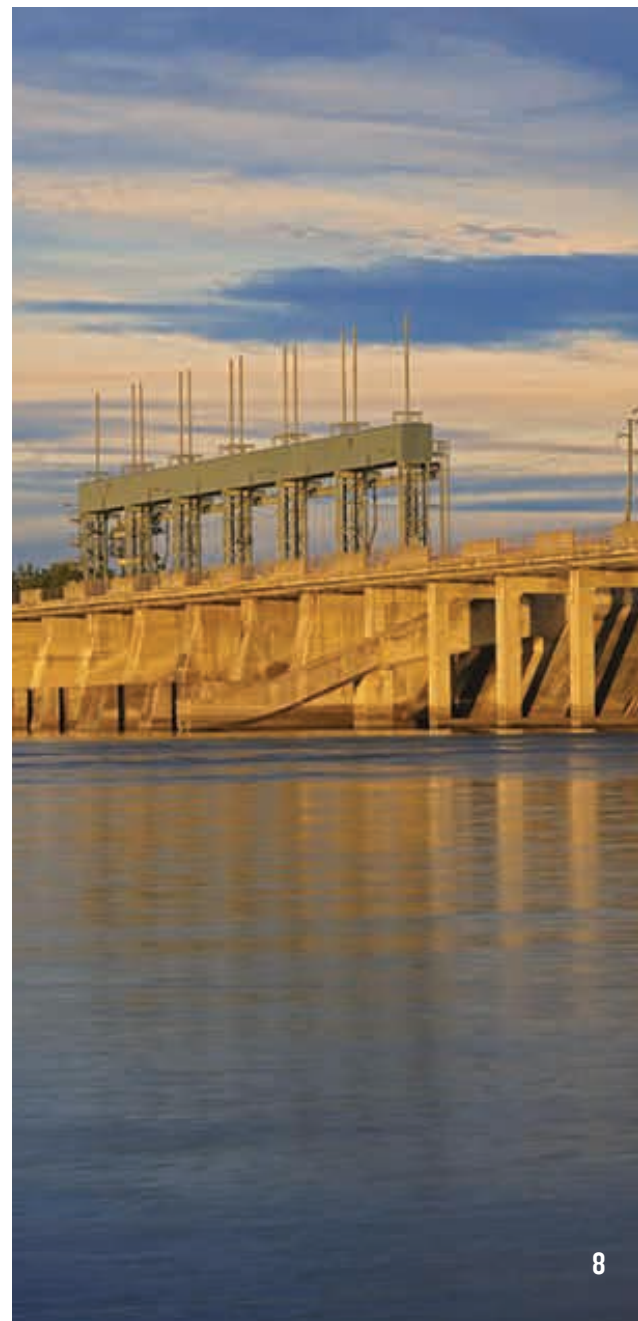
LEADING BY EXAMPLE – MANITOBA'S PREVIOUS ACTIONS

From hydro-electric development to protecting Manitoba's expanse of boreal forest and exporting highly innovative green transportation solutions, Manitoba has a track record of approaching climate change and green economic growth with innovative solutions.

1. Clean Energy Investments – Manitobans have long benefited from some of the cleanest energy in Canada thanks to renewable hydro-electric power. The new Keeyask dam is being developed in partnership with local First Nations communities, providing training, employment and local economic development opportunities. The power generated is part of a clean energy grid that reduces GHG emissions in Manitoba and other jurisdictions, while Manitobans enjoy among the lowest utility rates in North America.

Manitoba Hydro

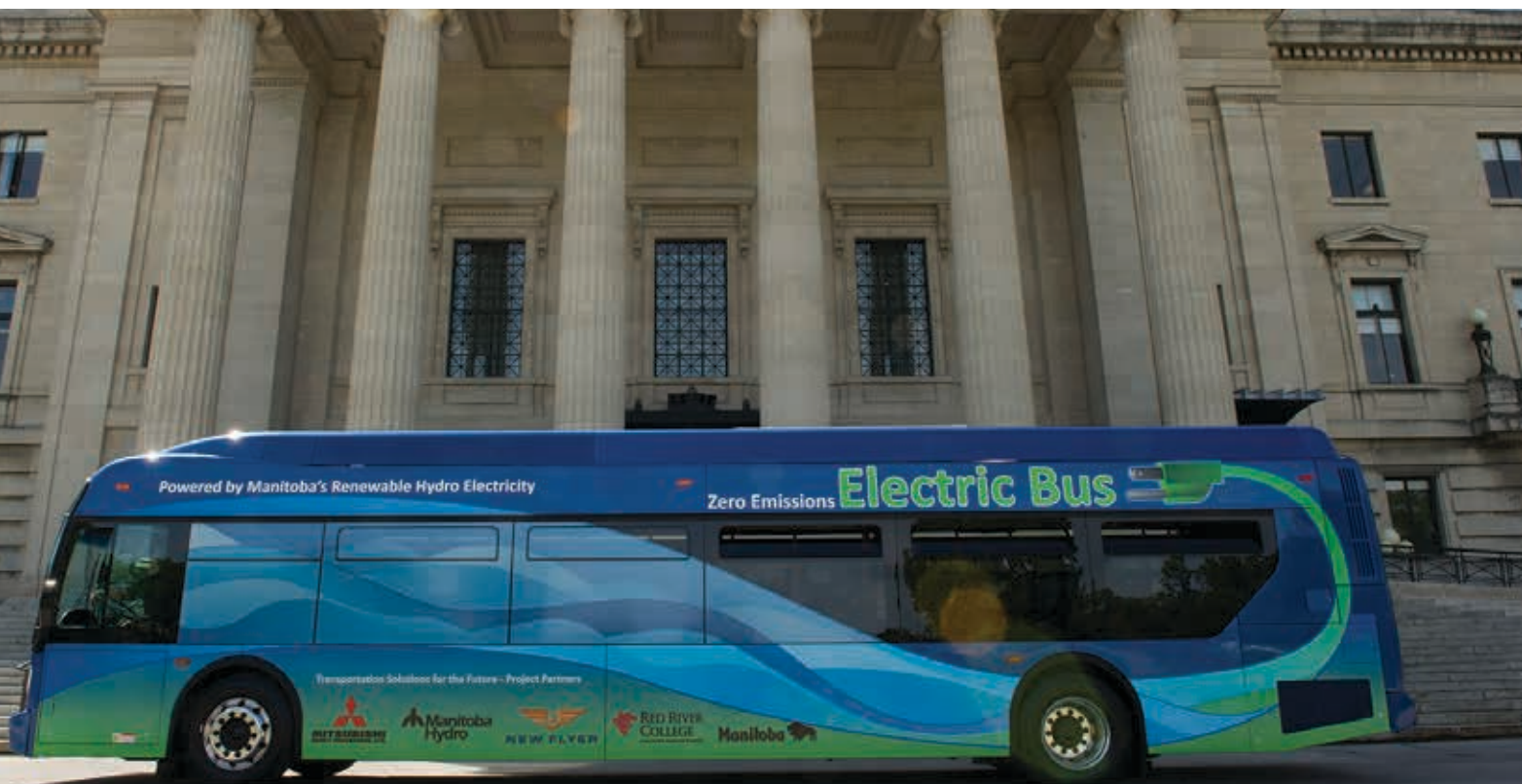
Manitoba Hydro is committed to working in cooperation with Indigenous communities and is striving to represent local communities in the workplace. Over 1870 Indigenous people were working at Manitoba Hydro operations, at the Keeyask site and on Bi-Pole III in the fall of 2015. At the same time, more than 175 Indigenous people were registered in a variety of technical training programs offered by Manitoba Hydro, preparing to work on powering Manitoba's renewable energy.



Spotlight on New Flyer Industries

New Flyer Industries, based in Winnipeg, is a leading manufacturer of electric and hydrogen fuel cell buses in North America. They incorporate advanced environmental management and health and safety standards to support local green jobs. Zero-emission battery-electric propulsion transit buses significantly reduce GHG emissions and local air contaminants.

- 2. Geothermal Energy** – Despite low natural gas prices, Manitoba is still a Canadian leader in geothermal heating and cooling with over 13,000 heat pump units installed throughout the province. The Manitoba Geothermal Energy Incentive Program has provided financial support for over 1,000 Manitobans to install geothermal systems into their homes and community heating systems. In addition, since 2013 Aki Energy Inc., with the Manitoba Geothermal Energy Alliance, has coordinated the conversion of approximately 350 homes from electric heat to geothermal heating and cooling with the Fisher River Cree Nation, Peguis, Long Plain and Sagkeeng First Nation communities.
- 3. New Wind Power** - Manitoba is home to two utility scale wind farms with a total capacity of 258 megawatts – enough to power 90,000 households. Future wind-farm developments will be considered as economic conditions allow.
- 4. Biomass Innovation** – In 2012, Manitoba implemented an Emissions Tax on Coal and Petroleum Coke. A ban on coal and petroleum coke will come into effect in 2017. The revenues from the tax are used by the Biomass Energy Support Program, which helps former users of coal to transition to locally grown, renewable energy sources that create local jobs and reduce GHG emissions. The Biomass Energy Support Program also funds applied research projects that support the growth of the biomass industry.
- 5. Investing in Public Transit and Active Transportation** – Manitoba has committed \$287 million to the development of rapid transit in Winnipeg and created the Small Communities Transportation Fund to support active transportation and mass transit throughout the province.





- 6. Powering Public Transit** – Provincial transit operating grants assist the City of Winnipeg and four other Manitoba cities in the operation of their public transit systems. Funding is provided through a 50/50 transit funding partnership, through which Manitoba shares 50 per cent of the net operating cost of municipal transit services. Capital grants are also provided to support the purchase of new transit buses. In 2014/15, \$40.8 million was directed to public transit in Manitoba, including \$3.7 million for rural locations through the Building Manitoba Fund.
- 7. Investing in Innovation** – Manitoba and its partners invested \$3 million over three years in the development of an all-electric battery transit bus and charging system. Manitoba and its partners have also expanded the project to a four bus demonstration on a regular in-service Winnipeg Transit route. Manitoba has also provided \$645,000 for the creation of an electric-vehicle learning and demonstration centre at Red River College.
- 8. Promoting Sustainable Farming Systems** – Manitoba introduced a variety of programs to help in the reduction of GHG emissions from agricultural practices that also provide benefits to our food production system. From 2009 to 2012, Manitoba Agriculture, Food and Rural Development offered the Manitoba Sustainable Agricultural Practices Program (MSAPP), with a focus on mitigating on-farm GHG emissions. This reduced GHG emissions by an estimated 35,000 tonnes CO₂e per year over the three years of the program.
- 9. Streamlining Transportation** – Manitoba's trucking industry can now take advantage of new provincial regulations allowing the use of new generation wide-base single tires that help reduce fuel consumption and improve gas efficiency. This newest action builds on incentives Manitoba has provided to promote technologies and innovation as a way to reduce GHGs in the transportation industry.
- 10. Developing Technology** – Manitoba partnered with the cities of Brandon and Winnipeg to implement landfill gas capture programs. Three of the province's largest landfills will make significant reductions to the amount of GHGs they release. Approximately 195,000 tonnes of GHG reductions will be achieved per year.
- 11. Protecting Special Areas** – The Manitoba government, in co-operation with Bloodvein First Nation, has protected the boreal forest under the Pimitotah Land Management Plan. More than 3,900 square kilometres (km²) of the Bloodvein First Nation's traditional land has been legally designated as a traditional-use planning area which defines how the land and resources will be protected while guiding future economic development. Manitoba is also in the process of securing a UNESCO World Heritage Site designation for Pimachiowin Aki, a 33,400 km² area that covers part of Manitoba and Ontario's boreal landscape.



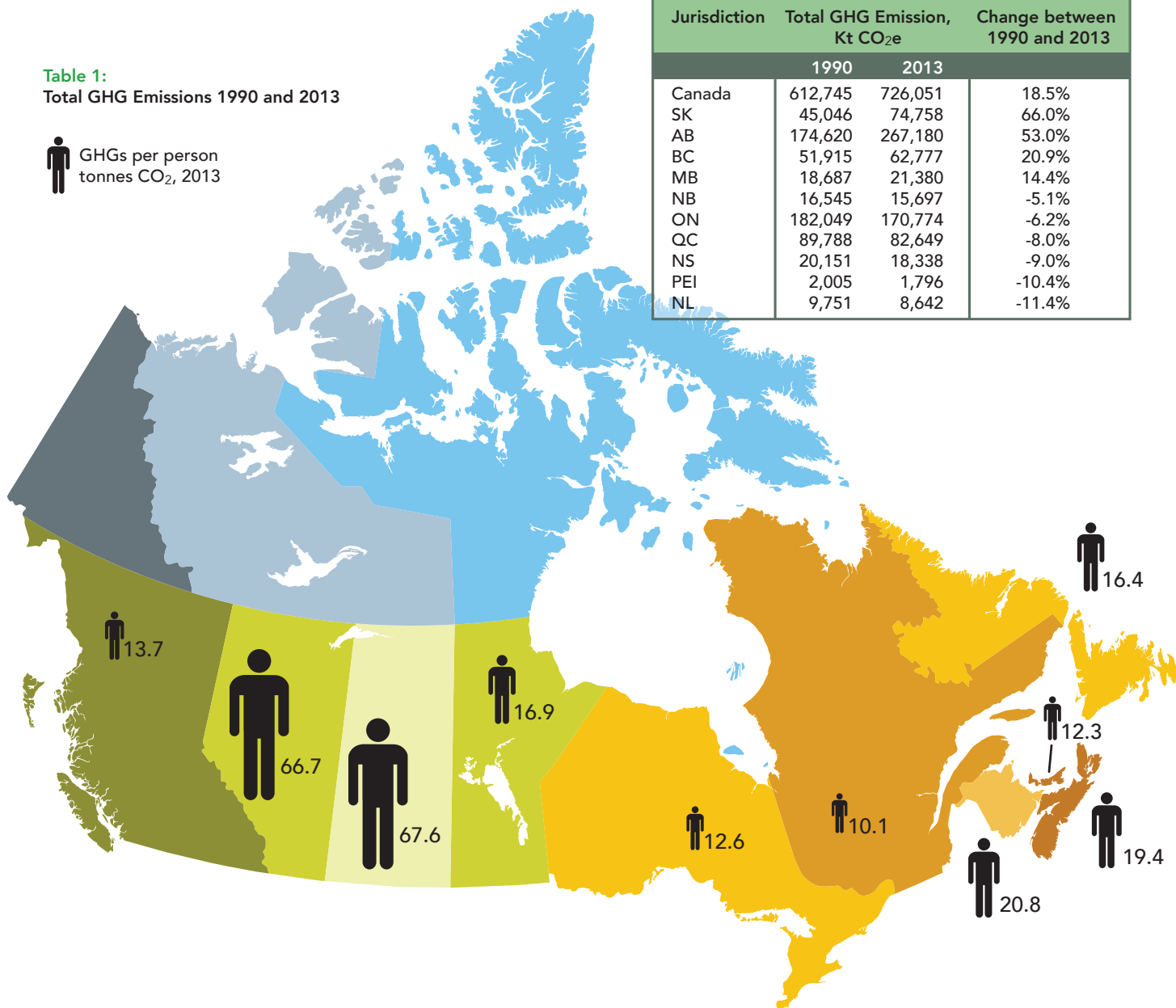
- 12. Supporting Research** – Manitoba has been a core funder of the globally-respected International Institute for Sustainable Development since its inception, and provides significant funding for the Experimental Lakes Area.
- 13. Advancing Adaptation** – Ongoing efforts to adapt to climate change have included major infrastructure investments such as the \$627 million Red River Floodway Expansion that was completed \$38 million under budget. This savings was invested in additional flood protection projects benefitting eight more communities. Permanent all season road construction has been undertaken to remote communities to replace vulnerable winter roads.
- 14. Demand Side Management** – Manitoba Hydro’s PowerSmart programs provide a wide variety of energy saving options. With the development of the next generation of energy-efficiency programs and delivery models, homes, businesses and institutions will be able to further reduce the energy they consume while saving money. Efforts at reducing domestic consumption of natural gas have resulted in a cumulative reduction in GHG emissions of just over 1.0 MT CO₂e in Manitoba and currently account for an annual reduction of just under 200 kilotonnes (Kt) per year.
- 15. Biofuels Mandate** – Since April 1, 2009 the total volume of gasoline sold in Manitoba must contain at least 8.5 per cent ethanol, resulting in annual GHG reductions of over 320,000 tonnes. Manitoba was also the first jurisdiction in Canada to implement a Biodiesel Mandate. Since November 2009, the total volume of diesel fuel sold in Manitoba must contain at least two per cent biodiesel on an annual pool average, resulting in annual GHG reductions of over 55,000 tonnes.
- 16. Historic Levels of Parks Investment** – Manitoba is investing \$100 million in park infrastructure between 2012 and 2020. Funds will be directed towards reducing our ecological footprint, including upgrades to recycling, waste management and wastewater treatment in provincial parks.
- 17. Enhanced East-West Power Grid** – In recognition of a mutual interest in further strengthening and securing Manitoba and Ontario’s respective power supplies, the two jurisdictions signed an agreement to investigate the potential of an enhanced east-west power grid and other mutually beneficial energy opportunities. Manitoba recently concluded a power sale agreement with Saskatchewan, and has been actively involved in the development of the Canadian Energy Strategy.

ACTION ACROSS CANADA

Table 1:
Total GHG Emissions 1990 and 2013

 GHGs per person
tonnes CO₂e, 2013

Jurisdiction	Total GHG Emission, Kt CO ₂ e		Change between 1990 and 2013
	1990	2013	
Canada	612,745	726,051	18.5%
SK	45,046	74,758	66.0%
AB	174,620	267,180	53.0%
BC	51,915	62,777	20.9%
MB	18,687	21,380	14.4%
NB	16,545	15,697	-5.1%
ON	182,049	170,774	-6.2%
QC	89,788	82,649	-8.0%
NS	20,151	18,338	-9.0%
PEI	2,005	1,796	-10.4%
NL	9,751	8,642	-11.4%





British Columbia

Target - reduce GHG emissions by 33 per cent below 2007 by 2020 and 80 per cent by 2050.

British Columbia's (B.C.) accounts for 8.6 per cent of the national emissions with 13 per cent of the population. B.C. met its interim target of reducing emissions by six per cent below 2007 levels by 2012. In 2008, B.C. introduced a tax on carbon. The tax progressively increased to \$30/tonne, which is equal to about seven cents/litre of gasoline and six cents/cubic metre of natural gas. The tax covers about 70 per cent of B.C.'s emissions. According to a study by Sustainable Prosperity, the tax has reduced emissions between five and 15 per cent. It generates about \$1.1 billion in revenue, which has been offset by tax cuts in other areas. B.C.'s public sector became carbon neutral in 2010, the first in North America.

Alberta

No Target

Alberta is Canada's largest emitter with 36.8 per cent of emissions with 11.4 per cent of the population. Alberta's new Climate Leadership Plan accelerates the transition from coal to renewable electricity sources, puts a price on carbon pollution for everyone beginning in 2017, and will set legislated emission limits for the oil sands. The Plan includes four key areas based on recommendations put forth by Alberta's Climate Change Advisory panel:

1. Phasing out coal plants and developing more renewable energy
2. Implementing an economy-wide carbon tax that will cover 78-90 per cent of provincial emissions
3. Capping emissions from the oil sands at 100 MT to prompt industry to produce fewer emissions per barrel of oil
4. Reducing methane emissions from oil and gas extraction by 45 per cent by 2025

There will be the following economy-wide price on carbon:

2017: \$20 per tonne

2018: \$30 per tonne

Saskatchewan

Target - reduce GHG emissions 20 per cent below 2006 by 2020.

Saskatchewan has the highest per capita emissions in Canada and is the fourth largest emitter. It represents 10.3 per cent of national GHG emissions, with 3.1 per cent of the country's population. In 2014, Saskatchewan opened the world's first commercial-scale coal fired power plant equipped with carbon capture and storage technology. The Boundary Dam Power Station (Unit 3) produces 110 megawatts of base-load electricity and will reduce greenhouse gas emissions by one million tonnes of carbon dioxide each year. This is equivalent to taking more than 250,000 cars off Saskatchewan roads annually.

Ontario

Target - reduce emissions 15 per cent below 1990 by 2020 and 37 per cent below 1990 by 2030.

Ontario accounts for 23.5 per cent of national GHG emissions, with 38.5 per cent of the country's population. It has recently committed to joining Quebec's cap and trade system. Ontario fully eliminated coal as a source of electricity generation in April 2014, representing the single largest climate change initiative in North America to date, projecting to reduce Ontario's emissions by 32.5 MT in 2020. Ontario's Growth Plan promotes land use that aims to minimize the length and number of vehicle trips in combination with actions that encourage the use of transit, walking and cycling.

Quebec

Target - 37.5 per cent when compared with 1990 levels by 2030

Quebec accounts for 11.4 per cent of national GHG emissions, with 23.2 per cent of the country's population. Quebec introduced a cap and trade system linked with California, which will generate \$3.2 billion annually by 2020 that will help the province transition to a low-carbon economy. Other interventions include an Electric Vehicles Action Plan and an incentive for purchase and installation of vehicle recharging infrastructure. The Quebec plan also supports vehicle fleet owners who want to enhance the energy efficiency of their vehicles to reduce GHGs and costs.

Canada

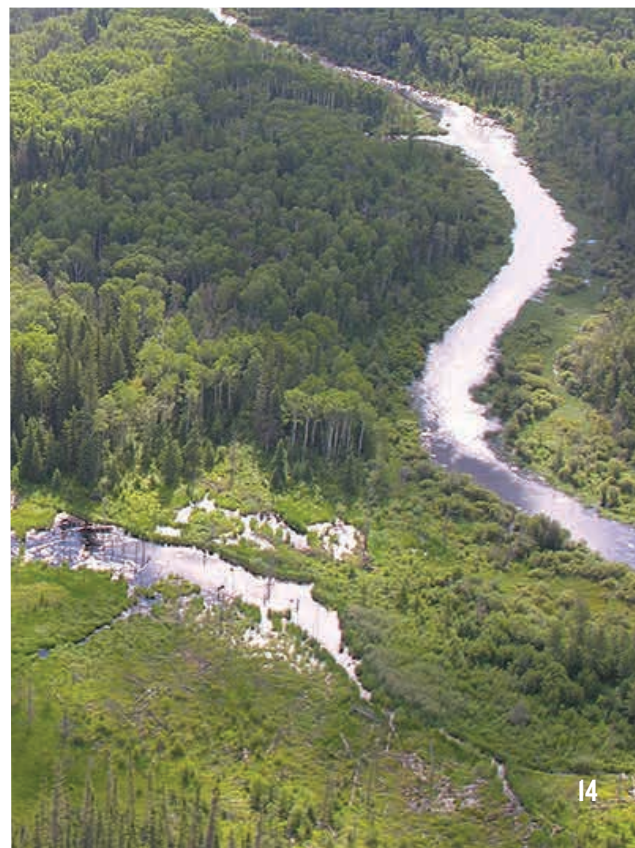
The Government of Canada submitted its GHG reduction goal to the United Nations, noting that it intends to achieve an economy-wide target to reduce greenhouse gas emissions by 30 per cent below 2005 levels by 2030. Canada's previous federal government committed to taking a sector-by-sector regulatory approach to addressing GHG emissions. It is not known if the new federal government will continue to develop sector-by-sector regulations; however it has indicated that it will work with provinces and territories to establish national emissions-reductions targets, and ensure that the provinces and territories have targeted funding and the flexibility to design their own policies to meet these commitments, including their own carbon pricing policies.¹

According to ECO Canada's 2013 report, environmental workers are defined as workers whose job duties include activities that support the effective stewardship of natural capital through the management or promotion of sustainable natural resource use, avoidance or mitigation of negative environmental impacts, and the maintenance or restoration of ecological services.

Based on 2013 survey results, ECO Canada estimates that there were 92,623 environmental employees in Manitoba. Of these 92,623 employees, 38,209 spent 50 per cent or more of their time on environmental tasks. ECO Canada calls these employees environmental professionals.

The percentage of environmental employees and environmental professionals in Manitoba is higher than Canada as a whole.

¹ <https://www.liberal.ca/files/2015/10/New-plan-for-a-strong-middle-class.pdf>





MANITOBA'S CLIMATE CHANGE CONSULTATIONS

The International Institute for Sustainable Development (IISD) led consultations on climate change and the green economy on behalf of Manitoba. The goal was to better understand views on what Manitoba's green economy and climate change profile should look like and what needs to be in place to secure long-term sustainable development. A total of nine group consultations and 67 bilateral meetings took place from October 2013 to January 2015. On average, 45 individuals met in each group session.

All of Manitoba's sectors are vulnerable to the impacts of climate change, but there are opportunities to thrive in a low-carbon development path by capitalizing on innovative solutions. IISD presented the following key recommendations on the topics of governance, regulatory streamlining, indicators for tracking progress and sector actions and policy advice related to partnerships, analysis and climate data, energy efficiency, renewable energy and reducing GHG emissions:

- Ensure policies are science-based.
- Enhance reporting on climate change plans, policies, programs, revenues and expenditures.
- Bring the private, not-for-profit and academic parties together to share research and work happening in different sectors.
- Review regulations to ensure they facilitate development of a green economy and remove barriers to adaptation.
- Track indicators on environmental protection, economic prosperity and social well-being.
- Increase access to clean technology.
- Expand bioenergy.
- Set procurement targets to require a percentage of energy comes from renewable sources.
- Conduct analysis integrating mitigation and adaptation for new initiatives.
- Add rigorous, credible economic analyses for actions to address climate change.
- Increase climate and emissions data and projections, including information on the expected climatic changes in our region.
- Increase investment in training and education to support a low-carbon and adaptive society.
- Create partnerships with municipalities to create climate-resilient infrastructure.
- Collaborate with post-secondary institutions to provide specialized training for green jobs.
- Mandate GHG reporting.



MANITOBA'S ACTION PLAN

WORLD LEADING DEMAND SIDE MANAGEMENT AGENCY

The Manitoba government is acting on the Public Utilities Board's energy efficiency recommendations. It is creating an independent Demand Side Management (DSM) subsidiary of Manitoba Hydro, with its own board and advisory stakeholder committee. This stand-alone entity will develop and deliver energy efficiency and conservation programs to meet new legislated targets for electricity and natural gas savings. With regulator oversight and independent third-party performance evaluations, Manitobans can expect an even more aggressive approach to finding cost effective energy savings, bill reductions and new ways to reduce their carbon footprint. The transition into the new subsidiary will occur over the next year.

The following is a list of energy efficiency initiatives, as well as initiatives that will aid in the transition away from fossil fuels. Together these initiatives will result in significant energy savings, energy bill reductions and decreased GHGs. The subsidiary will unfold a strong compliment of new programs beyond existing PowerSmart initiatives as it transitions into becoming operational. The Province of Manitoba is asking the DSM subsidiary to include the following initial measures and best practices as part of developing its comprehensive plan to enhance energy efficiency measures in Manitoba.

- 1. Legislated Efficiency Targets** – Manitoba will set electricity and natural gas savings targets under the *Energy Savings Act*. The DSM subsidiary will be required to meet 15-year targets with annual reporting on progress. On average, the subsidiary will have to meet 1.5 per cent of the total domestic electrical demand and 0.75 per cent of domestic natural gas demand, annually, through DSM activities.
- 2. Conservation Electricity Rates** – Manitoba Hydro will be required to include a conservation rate structure in the next General Rate Application. Customers will be provided a stepped rate structure that offers them a lower electricity rate for consumption up to a certain threshold. This revenue neutral initiative could also include time-of-use rates which encourage customers to reduce electricity consumption during peak periods of demand. This initiative, along with other actions to reduce domestic energy consumption, will reduce global GHGs by making more clean power available to current users of fossil fuels.
- 3. Energy Efficiency Product Standards** – By setting minimum energy efficiency standards (MEPS) for products, the Manitoba government will help drive the market towards increased energy efficiency. Manitoba will consult on a proposed MEPS framework to develop an objective process to identify, develop and implement MEPS in Manitoba for energy-using products.

Enhanced DSM in Manitoba could create up to 18 job-years per million dollars of program spending. New targets, such as 1.5 per cent per year of forecast domestic electricity demand and 0.75 per cent per year of forecast natural gas demand over 15 years, would lead to over 40,000 job years of employment with an annual investment of approximately \$150 million.

(Source: Dunsky Energy Consulting, 2015)



- 4. Limit Expansion of Natural Gas Infrastructure** – All natural gas expansion considerations must be evaluated against green heating options (ex: geothermal, biomass, solar) on a level playing field including comparison of public infrastructure investment and value of carbon reduction. The Public Utilities Board will be directed to consider this comparison in its approval process.
- 5. Energy/Water Efficiency Measures for Landlords** – Manitoba will work with landlords to meet minimum energy efficiency/water efficiency standards. Certain incentives will be offered to assist with necessary efficiency measures to become compliant.
- 6. Expand and Extend Geothermal and Solar Thermal Heating Incentives** – The new DSM subsidiary will consolidate the loans and grants programs. Grants will be expanded and made available in all parts of Manitoba that are serviced by natural gas and electricity and will be applicable for all customer categories. Special emphasis will be placed on new district heating opportunities.
- 7. Residential Smart Thermostat Pilot** – The new DSM subsidiary will implement a large-scale pilot of smart thermostats, which learn from user behaviors, allow people to control the climate in their home remotely, show energy consumption in real-time and adjust based on ambient conditions like humidity. In addition, the technology allows customers to instruct Manitoba Hydro to manage heating/cooling energy use during times of the day when demand on electricity is high or when natural gas demand can be reduced. Customers may be provided financial incentive to participate in demand response events.
- 8. Behavioural On-bill Awareness Program** – The new DSM subsidiary will provide better customer awareness of energy consumption compared to others in their neighbourhood and customize options to save energy and money. Detailed energy consumption will be calculated through meter and bill assessments and communicated with customers on their bills. The most energy intensive customers will be offered free or cost-shared in-home/building energy audits along with recommended measures to increase energy savings.
- 9. First Nation Commercial Building Energy Audits** – External consultants will be contracted to conduct commercial building audits on all First Nations in Manitoba. Cost effective energy efficiency measures will be implemented under Manitoba Hydro's Affordable Energy Program.



- 10. Expand PAYS** – The new DSM subsidiary would seek to enhance the Pay-As-You-Save (PAYS) financing option by assessing interest rates, energy savings calculators and expanding eligible energy efficiency measures (ex: heat recovery ventilators). The program will offer better access for low income people.
- 11. Expanded Social Enterprise Opportunities** – The new DSM subsidiary will hire social enterprises to perform energy and water efficiency actions in low income and First Nation communities. It will also provide start-up funding and training support to establish social enterprises to deliver programs in First Nations communities where needed.
- 12. Solar Photo Voltaic (PV)** – Solar PV will be added to Manitoba Hydro financing programs. Manitoba Hydro will undertake several demonstration projects to better understand equipment efficiencies and economic viability.
- 13. Fuel Switching from Electricity and Natural Gas** – Manitoba will consider implementing programs that help consumers switch from natural gas and resistant electric heat to green heat options including solar thermal, geothermal and biomass.
- 14. Renewable Heat Standard** – Manitoba will examine and consult on the development of a renewable heat standard that could develop an annual cumulative target for green heating equipment in Manitoba buildings.





NEW ENVIRONMENTAL RIGHTS LEGISLATION

In October 2015, Manitoba became the first Canadian province to sign the Blue Dot Declaration promoted by the David Suzuki Foundation. At the same time, the Manitoba government publicly committed to introducing new legislation that will ensure a healthy environment for all Manitobans and sustainable prosperity for future generations.

Where national constitutions do not explicitly recognize environmental rights, federal, provincial or local governments can legislate environmental rights by statute. Several Manitoba communities have already recognized people's right to a healthy environment, including Thompson, The Pas, Stonewall, Whitemouth and the Village of Dunnottar. At a provincial level, Manitoba currently recognizes environmental obligations through various statutes and policies. For example, *The Sustainable Development Act* does not explicitly deal with environmental rights of citizens, but does include provisions for public participation and access to information in its guidelines for sustainable development. Manitoba's *Environment Act* already contains provisions for citizen engagement at numerous stages of environmental permitting and licensing processes, including the right to appeal a licensing decision. These provisions are among the strongest in Canada. Manitoba will build on the strengths of its existing legislation with the following new elements:

- **Enshrining environmental rights in new legislation** - The legislation will formally recognize the environmental rights of Manitobans and will also include an Environmental Code of Practice that will require provincial government departments and Crown agencies to develop a statement of environmental values. Departments will then be required to take these values and the overarching code of practice into account when making any decisions that have the potential to impact the environment.
- **Creation of an oversight body** - An independent oversight body will be created that will review departmental statements and codes and ensure that departments and Crown agencies are adhering to their statement of environmental values. This oversight role would also include a level of public accountability and reporting.
- **Strengthening existing legislation** - Manitoba will incorporate amendments to both the *Sustainable Development Act* and the *Environment Act*, which could include enshrining the newly sanctioned UN Sustainable Development Goals under the Act. These globally-accredited goals could serve as important indicators for Manitobans to better understand the relative sustainability of our province.

There are 17 UN Sustainable Development Goals, which include:

- taking urgent action to combat climate change and its impacts
- reducing inequality within and among countries
- promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all



MANITOBA'S FIVE-YEAR - \$5 MILLION CLIMATE CHANGE ACTION FUND

Manitoba is committed to introducing new program measures to advance its Climate Change and Green Economy Action Plan. To kick start emissions reduction, over the next five years, Manitoba will invest \$5 million in local projects including:

Driving Innovation in Commercial Trucking

Significant new funding will be provided to the Manitoba Trucking Association (MTA) to help the trucking sector offset the costs associated with the purchase of fuel efficiency retrofit equipment for medium and heavy duty diesel vehicles. The trucking industry is uniquely reliant on diesel fuel, but fuel efficiency can be improved with aftermarket energy saving retrofits. Consuming less fuel brings environmental benefits by reducing exhaust pollution and greenhouse gas emissions as well as economic advantages of reducing operating costs and enhancing the economic competitiveness of our trucking sector. Manitoba will sign an agreement with the MTA recognizing our shared responsibility for addressing climate change, and committing to ongoing partnership and collaboration.

Farming for Our Future

Manitoba will pursue partnerships with Keystone Agricultural Producers (KAP) and the National Farmers Union (NFU) to examine ways of expanding markets and continuing to adopt sustainable farming practices to reduce GHG emissions while adapting agriculture to a changing climate. Manitoba will sign agreements with KAP and the NFU recognizing our shared responsibility for addressing climate change, and committing to ongoing partnership and collaboration.

Understanding Risks and Finding Solutions

Across Canada, regional centres have been established to support adaptation planning and action by governments, communities and companies within their respective jurisdictions. Manitoba will support the creation of a new leading-edge Prairie Climate Centre at the University of Winnipeg's Richardson College of the Environment. The centre will support the transition from knowledge to action by providing municipal governments, the private sector, civil society organizations and other practitioners with the practical information and tools they need to effectively plan for climate change adaptation. Through this partnership, Manitoba will work to develop co-ordinated and innovative approaches to increasing climate adaptation by:

- providing needed climate data, maps and other visual products for a variety of decision-makers, depicting climate trends and future climate scenarios for Manitoba
- enhancing awareness of the economic, social and environmental impacts of recent climate events and potential future climate change stresses across sectors, government and communities



- fostering research, knowledge creation and sharing of climate information, decision support tools and best practices among all stakeholders engaged in climate resiliency planning
- developing and refining decision support tools and providing hands-on assistance for municipalities and other organizations implementing climate resiliency initiatives
- delivering training and skill development programs for targeted stakeholder groups, including municipalities, youth and businesses
- creating a stronger community of practice on climate impacts and adaptation to help enhance capacity for innovative action across Manitoba, by establishing an Adaptation Table to share knowledge and provide advice

Growing Results

Manitoba will seed success by planting more trees under Trees for Tomorrow Revisited. Since the start of the first phase of the program in 2008, more than six million new trees have already been planted. This first phase is estimated to have achieved a cumulative GHG reduction of about one MT of CO₂ by 2042. Under the new phase, we will plant more than two million trees by 2020. This work will contribute to the growing green economy by engaging industry, Indigenous communities, municipalities and schools in a co-operative approach to investing in our urban and community forests.

Community Innovation

Funding will be provided to the Economic Development Council for Manitoba Bilingual Municipalities (CDEM) to help rural communities green their local economies by undertaking greenhouse gas emissions inventories, developing local climate change action plans and implementing projects that will help to build local-level resilience to climate change. Manitoba will sign an agreement with CDEM recognizing our shared responsibility for addressing climate change, and committing to ongoing partnership and collaboration.

Green Energy

Funding will be provided to Aki Energy to expand geothermal projects, and to install biomass and solar energy systems in First Nations communities.

CARBON PRICING

Carbon pricing is used as a tool to reduce greenhouse gas emissions while boosting economic growth and encouraging innovation. Carbon pricing may be implemented by a market-based cap-and-trade program or through other regulatory measures. Around 40 countries and 20 sub-national jurisdictions have now adopted or plan to put a price on carbon, approximately three times the coverage of a decade ago. Carbon pricing programs currently cover 12 per cent of global emissions. In the U.S., following five years of successful operation, the Regional Greenhouse Gas Initiative, which comprises nine states, successfully reduced emissions from thermal power generating stations by 18 per cent, while the economy grew by nine per cent over the same period.

Market-based programs have been used to successfully address other types of pollutants. For example, over a period of 25 years, the U.S. cap and trade component of the Acid Rain Program (ARP) has resulted in reduced sulphur dioxide (SO₂) emissions from power plants by 10 million tonnes (more than 60 per cent). The program, which covers more than 3,500 sources, has had near perfect compliance, with automatic penalties being assessed on sources found to have exceeded their emission allowances. Stringent emissions monitoring and transparent data ensure program integrity, and a robust allowance trading market has emerged.

Carbon pricing will be used to help Manitoba reach its GHG reduction goals while strengthening the economy and protecting the environment. Manitoba will enter into consultations with the Government of Canada, industry, non-governmental organizations and the public to explore the detailed implications of different carbon pricing mechanisms.

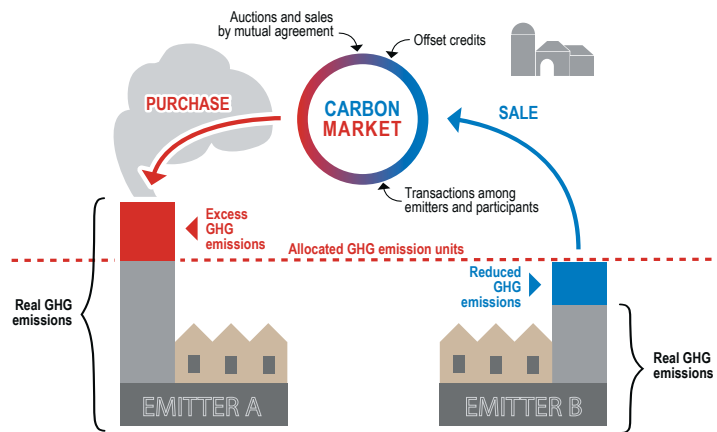
CAP AND TRADE

In addition to implementing mandatory GHG reporting, Manitoba will move forward on implementing a cap and trade program for large emitters. Details of Manitoba's program will be based on recommendations made during consultations, and outlined in new provincial cap and trade legislation. Manitoba's program will be designed to link with cap and trade programs in other North American jurisdictions.

Under a cap-and-trade system, government sets a carbon cap, which is the total emissions limit for covered sectors. The cap is set each year based on emission reduction targets. Government sells or distributes emissions allowances, which must be equivalent to the total cap on emissions. Low emitters can trade surplus allowances in the carbon market and high emitters can purchase allowances, so emitting GHGs becomes a cost of doing business. This creates an incentive for businesses to reduce their emissions.

Government can apply penalties if emissions exceed allowances and will receive additional revenue from the sale of allowances. This revenue can be used to support further carbon reduction and climate change adaptation initiatives. Cap and trade programs often allow for the limited use of offsets to achieve compliance. Offsets are projects that reduce emissions in non-capped sectors, with stringent protocols to ensure quality. Offsets may be purchased to compensate for emissions in excess of allowances.





Source: Government of Quebec, accessed October 2015 at www.mddelcc.gouv.qc.ca/changements/carbone/documents-spede/in-brief.pdf.

The Government of Quebec has introduced Canada's only system of cap and trade to help reduce its GHGs. Quebec's cap and trade program covers large industrial emitters, such as power facilities, cement, aluminum, pulp and paper and transportation and heating fuels. Ontario has recently committed to joining Quebec's cap and trade system.

CARBON STEWARDSHIP

Being good stewards of our society, economy and environment is critical if people are to sustainably live on this planet. Many companies are good environmental stewards. Carbon stewardship is a made-in-Manitoba model that embodies the responsible planning and management of GHG emissions. Under the Carbon Stewardship program, Manitoba tasks industry with becoming better stewards by creating plans to reduce their sectors' emissions.

Manitoba is already a leader in product stewardship. Governments across the country have also successfully used stewardship and extended product responsibility to deal with waste products, including used tires, electronics, containers and paper and packaging. Manitoba has implemented broad extended producer responsibility programming since 1995, which includes many products such as paper, packaging and beverage containers. Not only are these programs successful, they have formed the basis for our waste reduction and stewardship efforts.

While GHGs are not a tangible product which can be easily captured, recycled or destroyed, GHGs are a bi-product of certain activities, much like other waste. Through carbon stewardship, larger sources of GHGs can be reduced.

Under the Carbon Stewardship program, entities that produce GHGs would be responsible for reducing emissions much like companies that produce waste must recycle waste products. Manitoba would set GHG reduction goals for each covered sector and create a Producer Responsibility Organization (PRO) to govern the stewardship programs. As in the waste and recycling sector, the PRO could establish environmental levies and would then manage revenues and expenditures. Funds raised by levies would be reinvested by the PRO in measures to reduce GHGs. Decision-making under Carbon Stewardship rests with the PRO board, complemented by government reduction targets and reporting requirements. There would be repercussions for not meeting targets.

Manitoba will explore innovative carbon pricing options, including Carbon Stewardship, for sectors that are not covered by Manitoba's cap and trade program.



CARBON NEUTRAL GOVERNMENT

The Manitoba government will target its own environmental footprint and demonstrate carbon leadership by reducing emissions from government operations. The government will achieve significant reductions in carbon emissions through increased energy efficiency, less carbon-intensive transportation, greener offices and spaces and significant waste reduction.

Manitoba is committed to showing strong leadership by making its own operations carbon neutral. To achieve this goal, actions will be taken immediately. We will provide a complete inventory of our internal greenhouse gas emissions in 2018 and develop a comprehensive policy by 2020 for a carbon neutral government.

As a carbon neutral government, we will reduce our total carbon footprint and purchase carbon offsets for the remaining emissions. The offset program will be local and transparent, with regular audits to ensure that it is high quality and in the interest of Manitobans. Carbon neutral government is a key step towards achieving carbon neutrality for all of Manitoba by 2080.

The government will provide annual reports on its carbon footprint, including total emissions and emission sources, reduction achievements and offsets purchased. Manitoba has already taken significant steps to green government, including reduced printing, sustainable procurement and green buildings. **Manitoba's Recycling and Waste Reduction discussion paper** described recent initiatives and future plans to eliminate government waste and better support sustainable procurement.

GOVERNMENT BUILDINGS, LAND AND INFRASTRUCTURE

- 1. Greening Our Buildings** – Manitoba will expand Manitoba's Green Building Policy to include provincially owned and funded housing. The Green Building Policy provides criteria for sustainable building, including energy efficiency standards, to reduce emissions from the building sector. The policy currently applies to new provincially owned and funded commercial and institutional buildings, such as schools, hospitals, offices and recreational facilities.
- 2. Retrofitting Provincial Buildings** – Manitoba will retrofit all Manitoba-owned buildings to meet efficiency targets. The cost of retrofits will be partially offset by future energy savings. Where feasible, Manitoba-owned buildings will be converted to geothermal, solar or biomass energy.



- 3. Stimulating Innovation** – Manitoba will expand its presentations on the Research and Development Tax Credit and other incentives to sectors particularly well-positioned to drive the green economy, so that these tools are used to their fullest potential.
- 4. Local Food** – Under the *Farm and Food Awareness Act*, Manitoba will commit to a target of 20 per cent of government food procurement that is produced in Manitoba and purchased from Manitoba farmers and processors.
- 5. Building Green Heat** – Manitoba will increase the use of green heating options (geothermal, solar thermal, biomass) for heating and cooling in public buildings.
- 6. Managing Crown Lands** – Manitoba will lead by example by supporting innovative measures that promote climate change resiliency and healthy ecosystems on Crown lands. For example, Manitoba will improve water retention on Crown lands by adopting new approaches to land use and development that emphasize improved water management and sustainable grazing practices, while increasing the amount of carbon stored in grassland and wetland soil.
- 7. Building Resilient Infrastructure** – Manitoba will further incorporate climate decision support tools into components of design, construction, maintenance or operations of government buildings, through collaborative partnerships, case studies and capacity building activities.
- 8. Communications** – Manitoba will implement a public communication campaign to enhance understanding regarding climate change and the green economy.

GOVERNMENT TRANSPORTATION EMISSIONS

1. Greening the Fleet – The Manitoba government and Crown agencies will develop a comprehensive green vehicle fleet to enhance fuel efficiency. Government's fleet vehicle agency will show leadership in low-cost low-carbon transportation, while meeting the business needs of government.

Key actions include the following:

- transition existing fleet to electric and hybrid vehicles and other fuel efficient models
- install electric vehicle charging infrastructure at select government facilities
- introduce strict anti-idling rules and monitors
- green our parks by utilizing electric vehicles to the fullest extent possible
- provide education on fuel efficient driving
- reduce stock of light-duty trucks and share vehicles among agencies
- replace two-stroke engine equipment with lower emitting electric or four-stroke equipment

2. Green Commuting – Manitoba will expand transportation options, by ensuring that government buildings provide car-free commuting options. Government departments will be required to develop action plans that promote carpooling, car sharing, active transportation and enhanced transit use, for commuting and work-related travel.

3. Promoting Telecommuting and Virtual Meetings – Manitoba will help staff to work from home and reduce unnecessary commuting where possible. Virtual meetings will also be promoted and supported through technology and equipment upgrades and training.



REDUCING EMISSIONS ACROSS SECTORS

TRANSPORTATION

Greenhouse gas emissions from transportation are increasing. In 2013, transportation fuels were the number one source of emissions, contributing more than eight million tonnes of GHGs, or 39 per cent of all provincial emissions. Road transportation is a significant source, with most emissions coming from heavy-duty diesel vehicles and light-duty gasoline vehicles. The Manitoba government is committed to broad action by promoting sustainable transportation options and incentives.

Powering Transit & Heavy Duty Vehicles

Public transit reduces emissions created by passenger vehicles and provides families with a low-cost transportation option. Commuters want safe, convenient routes and affordable rides. Manitoba is committed to working with municipalities to ensure that public transit is an available and affordable green alternative for Manitoba families.

- 1. Greening Public Transit Fleets** – World-class all-electric battery buses are being developed and deployed in Manitoba. Manitoba will work with municipalities to green their transit fleets through more fuel efficient and better maintained vehicles, promoting green jobs and supporting the goal of maximizing the adoption of emission-free transit vehicles by 2030.
- 2. Zero-emission Transit Buses** – Manitoba will work with the City of Winnipeg to transition its transit fleet to zero-emission battery-electric buses.
- 3. Biodiesel for Heavy-duty Transportation** – Manitoba will pursue demonstrations of higher seasonal blends of biodiesel in the heavy-duty transportation sector including buses and freight trucking.
- 4. Promoting Green Trucking** – Manitoba will work with the Manitoba Trucking Association to help the trucking sector offset the costs associated with the purchase of fuel efficiency retrofit equipment for medium and heavy duty diesel vehicles. Funding will be provided through Manitoba's new five-year, \$5 million climate change action fund.
- 5. Planning for Transit** – Manitoba will encourage planning and development standards in small and large urban municipalities that support the provision and use of public transit, walking and bicycling through design and layout of road networks and pathways and design of new subdivisions and neighbourhoods.

Light Duty Vehicles and Equipment

Light duty vehicles include trucks, SUVs, and mini-vans. Consumer patterns in Manitoba reveal a trend toward purchasing larger, less efficient vehicles. Since 1990, emissions from light-duty cars have declined by 21 per cent, while over the same period, emissions from light-duty-trucks increased by 115 per cent.

- 1. Increasing Biofuels** – Manitoba will consult with stakeholders to increase the use of biofuels.
- 2. Driving Green** – Manitoba Public Insurance will integrate green driver education as a core requirement in driver training. Training will include broad-based public education and outreach on green vehicle maintenance, fuel efficient driving and tips for selecting fuel efficient vehicles.

Charging Up Electric Vehicles

Electric transportation offers significant benefits in Manitoba, compared to the use of conventional fossil-fuels. Based on using Manitoba's local hydroelectricity, electric transportation broadly translates to: much lower operating costs for individual vehicles; dramatically reduced greenhouse gas (GHG) emissions; and significantly reduced fossil-fuel imports.

Manitoba will make it easier for Manitobans to switch to electric vehicles by increasing the availability of electric vehicle charging stations at public destinations in partnership with municipalities. Manitoba will develop programs to finance the cost of installing electric vehicle charging stations in homes and offices. Government will pursue regulatory changes, so new buildings and major renovations are made EV ready to avoid higher retrofit costs later down the road. Manitoba will work with the Winnipeg Airports Authority to develop a fleet of electric locally-used vehicles and to improve EV infrastructure.



The University of Winnipeg pledged to reduce its GHG emissions 10 per cent below 1990 levels by the end of 2016. By the end of 2013, the university had reduced its emissions by approximately 25 per cent since 1990, even with campus floor space increasing 35 per cent between 1990 and 2013. The university estimates that the energy retrofits completed to date will pay for themselves via annual utility savings in less than nine years. The U of W diverts approximately 50 tonnes of organic material from the landfill every year. The university also launched an award-winning approach to campus food through Diversity Food Services. Diversity prioritizes purchasing local, organic food; in 2013, 65 per cent of the food it purchased came from within 100 km of its downtown location.

<http://news-centre.uwinnipeg.ca/all-posts/uwinnipeg-exceeds-kyoto-accord-goal/>

<http://news-centre.uwinnipeg.ca/all-posts/uwinnipeg-continues-to-excel-in-kyoto-commitments/>

BUILDINGS AND INFRASTRUCTURE

Up to 17 per cent of our GHG emissions are from heating and cooling buildings. The Manitoba government will develop a suite of new measures to increase energy efficiencies.

- 1. Measuring Up** – Manitoba will start a building energy use intensity and water use intensity program with the intention to establish Manitoba benchmarks by 2019. Manitoba will quantify the benefits attributable to green building initiatives and programs.
- 2. Greening Energy Equipment** – Manitoba will continue to invest in the Green Energy Equipment Tax Credit to enable increased access for Manitoba businesses and households to green and affordable equipment.
- 3. Electric-vehicle Readiness** – The Province will ensure that new buildings and those with major renovations are made ready for electric vehicles, to avoid higher retrofit costs at a later date.
- 4. Encouraging Wood-frame Construction** – Manitoba will revise the provincial building code to allow wood-frame construction for buildings up to six storeys. Building with wood emits fewer GHGs than cement construction.
- 5. Fossil Fuel Freedom** – Manitoba will implement a fossil fuel freedom campaign aimed at educating families on how to transition to a lower carbon future.
- 6. Energy Jobs Fund** – Manitoba is exploring the expansion of the Energy Jobs Fund to support the development and delivery of technologies that reduce our reliance on fossil fuels and increase the development of renewable energy.
- 7. Training and Outreach** – Manitoba will update construction codes to capture GHG reductions and other efficiencies using lessons learned from programs such as LEED, Smart Way and ENVISION.





AGRICULTURE AND RURAL DEVELOPMENT

Agriculture accounts for 31 per cent of all greenhouse emissions in Manitoba, not including emissions from off-road agricultural equipment which are reported in the transportation sector. Agriculture is also a key economic driver for Manitoba, producing essential food, fuel and fibre.

Manitoba farmers have been steadily adopting practices to increase efficiencies, including the use of enhanced efficiency fertilizers and precision agriculture technology. Manitoba will support the following initiatives to promote sustainable agricultural practices, leading to greater resiliency to a changing climate, reduced emissions and a growing green economy.

- 1. Forging Partnerships** – With funding available through Manitoba’s new five-year, \$5 million climate change action fund, Manitoba will partner with Keystone Agricultural Producers and the National Farmers Union to investigate on-farm measures for meeting agricultural climate change objectives and to analyze options that will support mitigation of GHG emissions and enhance the adaptive capacity of the agricultural sector.
- 2. Building Resiliency** – Manitoba will expand the focus of the Environmental Farm Plan-related programming from assessment of agri-environmental risks towards building resiliency against adverse weather effects on farms.
- 3. Sustaining Growth** – Manitoba will launch a new Climate Friendly Agricultural Practices Program to provide incentives for beneficial management practices, support advanced and applied research, and enable technology transfer to build farmer and industry capacity for climate friendly agriculture.
- 4. Improving Soil Stewardship** – Manitoba will continue to provide information on soil management, including information on residue management, tillage, salinity, soil structure and soil health. Sustainable fertilizer and manure management information and technology transfer is offered through the soil fertility extension program, the Growing Assurance Environment program and the 4R Nutrient Stewardship agreement with Fertilizer Canada and Keystone Agricultural Producers.
- 5. Promoting Perennial Crops** – Manitoba will promote perennial grains and forages to conserve soil and store carbon through research partnerships, including with the University of Manitoba and the Manitoba Forage and Grassland Association.

Successes to date

The Manitoba government, Fertilizer Canada and Keystone Agricultural Producers recently signed their second 4R Nutrient Stewardship agreement that formalizes a joint commitment to support agriculture production and environmental protection by promoting sound fertilizer use. The 4R Nutrient Stewardship system encourages nutrient application using the right source, at the right rate, at the right time and in the right place to minimize GHG emissions and other nutrient losses to the environment. The 4R Nutrient Stewardship agreement recognizes that practices must be customized to fit each farm's unique climate, soils, crops and operations. The agreement provides information to producers, agronomists and others who influence fertilizer management decisions in Manitoba. Examples of research findings being communicated through the agreement include the importance of preventing excessive nitrogen applications in reducing GHG emissions.

6. **Promoting Soybeans and Pulse Crops** – Manitoba will work aggressively with industry and academia to support expansion of soybean and pulse acres to reduce consumption of synthetic nitrogen fertilizer and the resulting nitrous oxide emissions.
7. **Supporting Research** – Manitoba will support research to advance practices that reduce GHG emissions and increase soil carbon sequestration through funding and provision of facilities such as Crop Diversification Centres.
8. **Nurturing Organic Farming** – Manitoba will continue to promote organic farming systems to reduce energy use and GHG emissions. Comparisons of organic and conventional grain cropping consistently show lower energy use and GHG emissions for organic grain production.
9. **Enhancing Rural Infrastructure** – Manitoba will promote the expansion of high speed Internet and cell service to allow rural Manitobans to do their business at or closer to home, thereby reducing emissions, stimulating the growth of green jobs in local rural communities and enhancing overall rural economic development.
10. **Expanding Bioproducts** – Manitoba will continue the implementation of the Bioproducts Strategy to reduce GHG emissions through:
 - direct replacement of fossil fuels by biomass and biofuel
 - reduced in-field stubble burning
 - increased fuel-efficiency through light-weight biocomposites
 - increased long-term carbon sequestration with embedded bio-fibre (ex: auto parts)
 - promotion of natural fibre production (ex: flax, hemp)
11. **Local Food Production** – By producing nutritious foods close to where people live, we reduce greenhouse gas emissions associated with transportation and encourage healthy diets. Manitoba will increase support to local food production with particular emphasis on Indigenous communities and on encouraging small-scale farming.





PROMOTING A GREEN ECONOMY ACROSS ALL SECTORS

Manitoba employers are major partners in the transition to a green economy, in the creation and quality of green jobs and in the province's adaptation to climate change. Government can assist by creating the enabling conditions that allow business to innovate and thrive, through broad economic objectives and initiatives, policies and financial management priorities.

- 1. Green Tape Review** – Manitoba will undertake a green tape review by the end of 2017 to remove barriers to a green economy and to streamline regulatory processes. A comprehensive review across government will identify policies and regulations that may pose barriers to green technologies, products, practices and services.
- 2. Green Bonds** – Green bonds provide capital for new and existing projects with environmental benefits. Manitoba will review the applicability of green bonds to provincial projects and provide recommendations for future issuance of a provincial green bond.
- 3. Government Procurement** – Manitoba will support renewable energy, local food, and clean technologies, products and services through government procurement.
- 4. Climate Change Data** – Manitoba will increase access, collection and generation of climate and emissions data and projections so that businesses, associations, municipalities and the public can analyze options for adaptation and innovation.
- 5. Fossil Fuel Subsidies** – Manitoba will review fossil fuel subsidies and support a transition to sustainable economic alternatives.
- 6. Bio-Products** – Manitoba will support a sustainable bio-products sector that will fuel the growth of our rural and northern economy.
- 7. Energy Opportunities Office** – Manitoba will continue the work of the Energy Opportunities Office to promote local business expansion and new investment opportunities in Manitoba's growing clean energy economy.



WETLANDS AND FORESTS

Manitoba's forests and wetlands, including peatlands, store a significant amount of carbon and help to mitigate the current and anticipated future impacts of climate change such as flooding and drought. Across Canada, we lose 11,817 hectares of wetlands each year. When wetlands are drained, they release stored CO₂ into the atmosphere. Each year, wetland drainage across Canada adds the equivalent of CO₂ emissions from 200 cars to the atmosphere.¹

Wetlands also provide a number of other benefits such as storing floodwater and excess nutrients; recharging groundwater; and providing valuable wildlife habitat. Wetlands act as a sponge and a filter of excess nutrients and other pollutants. Wetlands across the agricultural landscape provide unique micro-climates and needed local moisture during drought periods.

- 1. Protecting Manitoba's Boreal** – Manitoba is committed to making a significant contribution to protecting the boreal region and to balancing protection of the region's ecological integrity with societal values and economic needs in a new Boreal strategy. A summit in early 2015 brought together representatives from Indigenous communities, industry, academia, non-governmental organizations, and all levels of government to discuss how a Boreal strategy should be developed and what components are required for success.
- 2. Stopping Wetland Loss** – To protect wetlands and the benefits they provide, Manitoba will deliver a no net loss of wetland benefits program, which will balance the unavoidable loss of certain wetlands and the benefits they provide with the restoration and enhancement of other wetlands, preferably within the same watershed. Under this program, the alteration or drainage of a wetland may be justified on the basis of broad social and economic benefit, but wetland restoration and enhancement will be required to ensure that overall, there is no net loss of wetland benefits.
- 3. Modernizing Forestry** – To support a low carbon and innovative economy, Manitoba will promote the utilization of forest biomass for new and existing products, support afforestation projects such as Trees for Tomorrow and continue research into carbon sequestration in Manitoba's forests and peatlands.

¹ Ducks Unlimited Canada. Fact sheet: Wetlands and Climate Change.

Climate Change and Manitoba's Boreal Region

Manitoba's boreal region, which spans 570,000 square kilometres, provides invaluable ecological goods and services, perhaps most notably the 30 billion tonnes of carbon stored by the region's wetlands and forests, an amount roughly equivalent to the greenhouse gas emissions generated by Canada in about 150 years. Part of the boreal region is Pimachiowin Aki (which means The Land that Gives Life in Ojibwe), a proposed World Heritage Site that is over 33,400 sq. km in area. Pimachiowin Aki is larger than Belgium, and is the largest protected area in the North American boreal shield.

Based on recent research, some areas and tree species of the boreal forest may have higher productivity in the long term due to increased carbon dioxide in the atmosphere and a longer and potentially wetter growing season as a result of a changing climate. However, current challenges such as insect pests, drought and forest fires may increase in intensity and frequency, potentially amplifying these impacts of climate change on the forests. While some increases in forest productivity are expected in general, there is a concern that large areas of the southern boreal forest in Manitoba may no longer be able to support forest growth, particularly if the climate becomes drier and warmer.^{2,3} As the climate becomes warmer, the southern boreal forest in Manitoba is likely to diminish and become more fragmented, while the current northern extent of the boreal may advance further north if soil conditions and other local environmental conditions allow.

4. Terrestrial Carbon Management Plan – Manitoba contains vast areas of forest and peatland landscapes and agricultural lands that sequester atmospheric carbon and mitigate the effects of climate change. The Terrestrial Carbon Management Plan was developed to increase awareness of carbon cycles and ensure responsible resource management in an effort to enhance the carbon storage capacity of Manitoba forests and peatland ecosystems. The focus of the action plan is to increase scientific knowledge of terrestrial carbon stocks and cycles, promote stewardship of carbon pools and understand and incorporate terrestrial carbon pools in Manitoba's climate change initiatives and policies.

5. Sustaining Forest Management – Manitoba supports sustainable forestry practices that contribute to a strong economy. Manitoba will adopt more active adaptive management in response to the impact on forest composition from a changing climate to ensure that forests are resilient over the long term. The province will take proactive steps against any impacts, such as more challenging winter harvesting conditions, foreign species and more forest fires.

Key actions include the following:

- raising awareness of climate change impacts and building adaptive capacity within the forest industry and among other stakeholders and supporting enhanced partnerships with organizations involved in sustainable forest management
- incorporating climate change considerations in forest management planning
- conducting climate change vulnerability assessments on actively managed forests in Manitoba and developing climate-based growth and yield curves to incorporate into future resource modelling
- promoting landscape-level management planning to ensure resiliency and long-term productivity of forest ecosystems
- expanding monitoring programs to ensure effective management of invasive forest pests, tree species and diseases
- continuing research into future climate conditions and associated forest growth opportunities

² *Anticipating the consequences of climate change for Canada's boreal forest ecosystems. 2013. David T. Price, R.I. Alfaro, K.J. Brown, M.D. Flannigan, R.A. Fleming, E.H. Hogg, M.P. Girardin, T. Lakusta, M. Johnston, D.W. McKenney, J.H. Pedlar, T. Stratton, R.N. Sturrock, I.D. Thompson, J.A. Trofymow, and L.A. Venier. Environmental Reviews. 21 (4): 322–365*

³ *Sauchyn, D. and Kulshreshtha, S. (2008): Prairies; in From Impacts to Adaptation: Canada in a Changing Climate 2007, edited by D.S. Lemmen, F.J. Warren, J. Lacroix and E. Bush; Government of Canada, Ottawa, ON, p. 275-328.*

The Partners for Climate Protection program

The Partners for Climate Protection (PCP) program is a network of municipal governments that committed to reducing greenhouse gas (GHG) emissions and acting on climate change. PCP is a partnership between the Federation of Canadian Municipalities (FCM) and ICLEI – Local Governments for Sustainability, which is the Canadian component of ICLEI's Cities for Climate Protection (CCP) network.

PCP has developed a five-milestone framework that can guide municipal governments to take action to reduce GHG emissions from the community and municipal operations, protect the climate and provide many other benefits such as financial savings, improved economic performance, reduced traffic and cleaner air.

The five milestones are:

- 1) creating a greenhouse gas emissions inventory and forecast
- 2) setting an emissions reductions target
- 3) developing a local action plan
- 4) implementing the local action plan or a set of activities
- 5) monitoring progress and reporting results

LAND-USE PLANNING AND MUNICIPAL ACTIONS

As engines of growth and innovation, municipalities have a unique position in reducing emissions, while creating sustainable, healthy and economically strong communities. Emission growth is directly related to land-use patterns and associated road and transportation networks. A climate-smart growth approach to land-use policy will help municipalities pursue smart growth development, while reducing greenhouse gas emissions. Smart growth communities are more energy-efficient, healthy and economically strong.

Manitoba's communities are also vulnerable to the varied impacts of a changing climate. Promoting integrated, sustainable land-use planning is central to enhancing resilience and adaptive capacity. The Manitoba government will improve guidelines for storm water management and other aspects of land-use planning, to promote and showcase tools and best practices that support climate-smart growth principles, while making these communities more livable, resilient and prosperous.

- 1. Preparing for Risk** – By supporting community innovation through funding to the Development Council for Manitoba Bilingual Municipalities (CDEM), Manitoba will support enhanced, evidence-based decision making in the planning and operation of municipal infrastructure. This will enable better preparation and response to extreme climate events associated with a changing climate. Resilient municipal infrastructure will help foster a green and prosperous economy for rural Manitoba.
- 2. Promoting Community-led Projects** – Funding through Manitoba's new five-year, \$5 million climate change action fund will be provided to CDEM to help rural communities green their local economies by undertaking GHG emissions inventories, developing local climate change action plans, and implementing projects that will help to build local-level resilience to climate change. CDEM will sign an agreement with Manitoba to partner on climate change projects that benefit local communities.





- 3. Climate Smart Growth** – Manitoba will work with municipalities and communities in incorporating the principles of climate smart growth to reduce GHGs. This work will promote:
 - compact, higher density residential and commercial development that incorporates infill and brownfield development
 - closer proximity between areas of employment, commercial, educational and recreational activities and destinations, which makes active transportation possible and attractive
 - complete, mixed residential, commercial, institutional and light industrial land uses that make communities self-contained
 - road networks that are designed to support public transit, and pedestrian and bicycle paths that are linked together to allow direct travel between destinations
 - new tools and best practices in sustainable subdivision and development designs that support GHG emissions reduction
- 4. Supporting Change** – Manitoba will align the federal Gas Tax Agreement and other funding agreements to better enable municipalities to integrate climate change adaptation into municipal development plans, secondary plans and by-laws as part of integrated community sustainability planning.
- 5. Electric-vehicle Charging Stations** – In partnership with Manitoba municipalities, Manitoba will increase the availability of electric-vehicle charging stations at public places.
- 6. Integrating Planning** – Manitoba will better align Integrated Watershed Management Plans and Development Plans with GHG reduction targets, climate change impact analysis and adaptation actions, stormwater management, sustainable transportation plans and district energy options.
- 7. Creating Opportunity through Training and Education** – Manitoba will support enhanced rural economic development, training and education, through action on climate change that fosters innovative and sustainable solutions, leading to a low-carbon economy.
- 8. Municipal Energy Planning** – Manitoba will explore options to support municipalities' efforts to better understand their local energy needs, identify opportunities for energy efficiency and clean energy and develop plans to meet their goals.
- 9. Active Transportation** – Manitoba will work with municipalities to better integrate active transportation into development plans and secondary plans.





WASTE REDUCTION AND RECYCLING

Manitoba's waste sector contributes up to five per cent of emissions. The bulk of these emissions (approximately 1 MT) come from landfills, with a small amount from wastewater handling. Up to 100 kilograms of methane is produced from each tonne of waste disposed at a landfill. Diverting waste presents significant opportunities to avoid producing GHGs. For example, for every tonne of cardboard recycled instead of being burned or landfilled, 3.5 tonnes of CO₂e are eliminated.

Manitoba will continue to engage with industry, businesses, institutions and communities to achieve further reductions of GHG emissions through sustained solid waste reduction and improved waste management practices, while promoting green economic opportunities.

Manitoba's **Recycling and Waste discussion paper** proposes steps for a 50 per cent reduction in the amount of waste going to landfill between 2013 and 2020. Actions to reduce waste entering Manitoba landfills are expected to reduce overall GHG emissions by 340,000 tonnes of CO₂e, equal to taking 71,000 cars off the road by 2020.

The greatest potential for emissions reduction can be achieved through better end-of-life management from residential, industrial, commercial and institutional sectors for various waste materials, including food scraps, carpet, used corrugated cardboard, blue box recyclable materials and dimensional lumber or wood.

Manitoba will focus on diverting these waste materials from landfill disposal through recycling and composting to deliver emissions reductions that contribute towards Manitoba's climate action goals. Meeting these opportunities may require expansion of processing, reuse and manufacturing infrastructure. Research and development of best practices for recycling and composting of waste materials will continue to be supported.

Waste reduction measures to reduce GHG emissions to meet Manitoba's climate change target include the following.

- 1. Capturing Methane** – Manitoba will support more projects to capture methane from existing landfills. Depending on many variables, captured methane can either be destroyed or used as a source of energy.
- 2. Diverting Waste** – Manitoba will work with municipalities and the private sector to reduce waste through incentives. Programming to promote diversion of organics, such as curbside composting, and other waste materials from landfills will be developed.

The Manitoba Composts Program

The Manitoba Composts Program was announced June 27, 2014. This program provides up to \$1 million in annual funding for organic waste diversion efforts, with a goal to divert 100,000 tonnes of organic waste from landfills. Funding is allocated in the form of incentive payments to municipal and private compost facilities that meet the program criteria for processing organic waste. Program funds will also be used to support training, research and market development for composting, as well as projects that develop composting infrastructure and equipment. This program intends to increase the capacity for large scale centralized composting, expand municipal curbside collection of organic material and provide a foundation for growing the composting industry in Manitoba.

Since the announcement of the Manitoba Composts Program, there has been an increasing interest from a number of municipalities, private companies and social enterprises to offer green bin curbside compost collection as well as processing. In 2014, eight composting sites registered with the program and reported processing 42,858 tonnes of eligible organic waste supported by \$477,000 in Manitoba Composts Support Payments. This equates to 33kg/capita towards the goal of 85 kg/capita (75 per cent of the reported material was leaf and yard waste). This is a good start, but in order to reach the target, there is a need to focus on food waste reduction and increasing capacity for diversion to composting facilities, through curbside collection from the residential sector and enhanced industrial, commercial and institutional collection capacity.

- 3. Modernizing Landfills** – Manitoba will consult on landfill bans for things such as organics and used corrugated cardboard. A ban on burning compostable and designated recyclable materials including wood waste will be considered.
- 4. Green Jobs and the Economy** – Manitoba will divert waste to increase employment and economic activity in Manitoba. In 2014, the Conference Board of Canada confirmed that waste diversion in North America results in job creation and local economic growth. For every 1,000 tonnes of waste material diverted, two jobs can be created, and it is estimated that ten times more jobs are created by recycling waste than landfilling it. In addition to the environmental costs, there are also significant costs to government and businesses associated with waste disposal. Increased waste diversion presents a significant economic opportunity. About 450 green jobs in the waste sector can be created.
- 5. Diverting Organic Waste** – Manitoba will divert more organic materials. Manitoba could divert 100,000 tonnes of organic waste annually from landfill by 2020 - this is equivalent to diverting over 15,000 garbage trucks from landfill each year. Diverting 100,000 tonnes of organic waste (60 per cent food waste, 40 per cent leaf and yard) will reduce greenhouse gas emissions from waste by 59,000 tonnes of CO₂e.
- 6. Reporting Progress** – There are 184 operating landfills in Manitoba. In 2014, a total of 981,040 tonnes of waste was sent to landfill, 836 kilograms per capita. Manitoba will continue to report annually on the amount of waste disposed, the amount of landfill gas recovered, materials recycled and organic waste composted.



The internationally recognized Schools on Board program, based out of the University of Manitoba, uses the real hands-on learning environments of the research ship CCGS Amundsen and the Churchill Northern Studies Centre to expose students and educators to some of Canada's leading Arctic climate change research. These initiatives promote applied science education and increased understanding of climate change, inspiring the next generation of environmental stewards in Manitoba.

Manitoba currently supports a range of hands-on climate learning opportunities for youth and adults offered through organizations and groups such as Manitoba Museum, FortWhyte Alive, Green Action Centre, Assiniboine Park Zoo, Manitoba Education for Sustainable Development Working Group and others that aim to help Manitobans become responsible citizens in their communities.

BUILDING RESILIENCE - PREPARING FOR FUTURE CLIMATE IMPACTS

ENHANCING AWARENESS, CAPACITY BUILDING AND APPLIED RESEARCH

Manitobans are accustomed to climate extremes and are used to adapting to our changing climate. However, recent climate trends have tested our ability to effectively deal with climate stressors such as floods, droughts, fire and extreme temperatures, placing additional pressures on our infrastructure and communities. Manitoba will help enhance the understanding of the impacts of a changing climate on our businesses, communities and infrastructure and identify the steps needed to enhance our resilience. Mobilizing Manitobans with the right information, decision support tools and other resources will enable action across sectors and regions.

- 1. Building Local Partnerships** – Manitoba will continue its support for Climate Change Connection, a Manitoba Eco-Network program. This will help to deliver education and outreach and to enhance awareness and capacity-building efforts more broadly, for a range of decision makers and stakeholders across Manitoba.
- 2. Churchill Marine Observatory** – Manitoba has provided funding to help enable climate research through a globally unique, highly innovative, multidisciplinary research facility located in Churchill, Manitoba, adjacent to Canada's only deep-water port in the Arctic. The Churchill Marine Observatory will allow researchers to directly address technological, scientific, and economic issues pertaining to marine transportation and oil and gas exploration and development throughout the Arctic. This research will be crucial to mitigating and adapting to the effects of a changing climate on Canada's Arctic and the world.
- 3. Addressing Climate Risk on Farms** – Manitoba's Agriculture Risk Management Review Task Force, with a focus on changing climate, will provide insights on programs and tools that would be most effective in addressing production risks for farmers related to climate extremes such as flooding and drought.





EDUCATION FOR SUSTAINABLE DEVELOPMENT

In order to reduce our GHG emissions and adapt to climate change, education for sustainable development (ESD) needs to be built into the education system, both at K-12 and post-secondary levels. Students need to be provided with the relevant foundational and technical skills, as well as develop the values and attitudes needed to build and support a sustainable and resource-efficient Manitoba. Manitoba is a leader in ESD, working towards enhancing a culture of sustainability in schools, schools divisions and post-secondary institutions across the province.

- 1. Enhancing Education for Sustainable Development** – Manitoba will continue to support strengthening the education system to address climate change and other important sustainable development issues through the following:
 - encouraging whole institution approaches by establishing ESD in school plans or embedding ESD in existing school plans in every school by 2019
 - promoting the extension of ESD in teacher education and in training of all educators
 - strengthening technical and vocational education and training in support of sustainable development and the transition to a green economy
 - strengthening climate change education to include incorporating traditional knowledge and Indigenous perspectives on climate change in the curriculum; developing a climate change resource for educators; and providing professional development for educators and training for school support staff
- 2. Supporting Retrofits and New School Builds** – Manitoba will work with post-secondary institutions to ensure any future deferred maintenance funding will prioritize green renovations and efficiency upgrades at institutions, and will continue to show leadership in designing new K-12 school buildings and retrofitting existing school buildings, to achieve a high level of energy performance.
- 3. Green Jobs** – Manitoba will encourage post-secondary institutions to introduce a green jobs focus in applicable programs. Incentives will also be provided to support the development of new post-secondary programming in support of a green economy.
- 4. Supporting Green Business** – Manitoba will encourage post-secondary institutions to partner with the private sector to develop and implement green business and green job training opportunities.
- 5. Integrating Sustainability in Institutions** – Manitoba will work with post-secondary institutions to support the integration of sustainability in their daily operations.

Manitoba's work on Education for Sustainable Development is highlighted as one of 25 game changers globally in the area of sustainable development through the UNESCO Green Citizens project

Education for Sustainable Development (ESD) is a top priority for Manitoba Education and Advanced Learning. Sustainable development is taught from kindergarten until the final year of high school and accompanies specific learning outcomes in science, social studies, health and physical education. The capacity of educators and school leaders is being built through the use of new methods and content that help schools to embed sustainability into their classrooms, facilities, operations and management. Schools across the province are being encouraged to have sustainable school plans in place. As a result, children, youth, educators and school leaders are becoming personally engaged in our schools and communities with the challenge of realizing sustainability.

"TomorrowNow - Manitoba's Green Plan" emphasizes the important role that education plays in ensuring Manitobans learn to live sustainably and commits to including ESD in formal education, public awareness and training beyond the classroom. In Manitoba, ESD is considered a key element in achieving Manitoba's transition to a low carbon, green economy.

UNESCO GREEN CITIZENS project provides a platform for the exchange of experiences to enable educators from all around the world to share their stories, teach others new practices and encourage others to work toward sustainable development in their communities.



ENSURING HEALTHY PEOPLE AND COMMUNITIES IN A CHANGING CLIMATE

Adaptation to climate change is an essential component of environmental health. It is also one of the major pillars of the Manitoba Public Health Strategy which strives for "All Manitobans living to their full potential in supportive environments." Environmental Health, as part of Public Health, is broadly concerned with the natural and built aspects of the environment and their effects on human health.

Through collaborative programming and strategies with other government departments, effective health policy will be developed that addresses the most pertinent health effects from climate change for Manitoba. Using the existing Manitoba One Health (OH) Steering Committee, there are structured means for collaborative health program advances. The Manitoba OH Steering Committee, consisting of representatives from five government departments, promotes the OH initiative and engages other government departments, community and industry partners and stakeholders in an effort to move towards a holistic approach to human, animal and environmental health issues. Plans are underway to address key current and future vulnerabilities, risks and opportunities related to a changing climate and associated extreme events.



Through joint consultation and targeted risk assessment, priority actions will be established in order to ensure Manitobans remain healthy, despite a changing climate. Currently, Manitoba is undertaking the following actions:

- 1. Monitoring Climate-influenced Vector Borne Diseases** – Manitoba will continue to track vector borne diseases which impact human health, particularly those that may enter Manitoba in a warming climate. Manitoba will develop strategies to prevent and manage climate-influenced diseases.
- 2. Increasing Resiliency to Cope with Extreme Heat Events** – Extreme heat events are expected to occur more commonly. Through the established provincial Heat Alert and Response System (HARS), Manitoba will continue to work with all levels of government and key non-governmental organizations in order to build capacity in planning for and responding to the health risks associated with extreme heat events.
- 3. Responding to Extreme Weather Events** – Heavy rainfall, flooding, ice storms and other extreme weather events can lead to a variety of physical and mental health impacts. Manitoba works with a number of partners such as disaster management organizations, emergency health services and regional health authorities to assist communities to prepare for, respond to, and recover from extreme weather events.
- 4. Preparing for Fires** – Current climate models indicate that summer conditions will likely be drier and warmer throughout much of Canada, thereby creating an increased risk of fire in Manitoba. Smoke results in significant reduction of air quality, which can cause adverse health effects for populations in the immediate vicinity of the fire, as well as those hundreds of kilometres away. Manitoba has partnered with Health Canada on a multi-year project, which will increase understanding of the health risks posed by fire smoke, and provide better information to protect the public during wildland smoke events.
- 5. Monitoring Food Borne Diseases** – Diarrheal diseases are more common when temperatures are higher, and have been found to occur more frequently in conjunction with both unusually high and low temperatures. Manitoba will continue to work with federal and provincial health counterparts to monitor and manage disease outbreaks secondary to emerging food borne pathogens that are affected by climate change.
- 6. Preventing Water Borne Illnesses** – Water quality and safety may be affected by increased extreme weather events. Manitoba will continue to monitor and develop appropriate policy to ensure ongoing drinking water safety. Increased temperatures will increase the likelihood of algae blooms. Manitoba continues to enhance measures to protect the public from algae blooms.

Enhancing Food Security

Globally, climate change is expected to threaten food production and certain aspects of food quality, as well as food prices and distribution systems. Food insecurity affects children and adults and is closely and inversely related to household income. Manitoba has identified food security as a significant issue. The Food Security Action Plan was developed as part of Manitoba's All Aboard Poverty Reduction and Social Inclusion Strategy. The Food Security Action Plan documents current food security initiatives in Manitoba and includes recommendations for future work. Current Manitoba Health, Healthy Living and Seniors food security initiatives include:

- Supporting the work of *Food Matters Manitoba* (FMM) a non-profit community service organization that works on a wide variety of issues related to food security in Manitoba, and particularly focuses on engaging children and youth in sustainable and healthful food projects.
- *Local Food Procurement Pilot Program* is a partnership with Manitoba Agriculture, Food and Rural Development and Food Matters Manitoba to pilot ways of increasing local food in institutional food streams, in both government and non-government institutions.
- *Northern Healthy Foods Initiative* (NHFI) whose primary focus is to support local food self-sufficiency. NHFI's Management Committee consists of five provincial departments led by Manitoba Aboriginal and Northern Affairs. Five northern partner organizations work with northern communities to increase access to healthy affordable food by building capacity for local production and consumption, lowering healthy food costs, creating food-based economic development and encouraging food and nutrition education, particularly in schools.

- 7. Managing the Health Impacts of Allergens** – Climate change is expected to result in more frost-free days and warmer seasonal air temperatures, and may contribute to increased pollen initiation species. Extreme rainfall and rising temperatures can also contribute to indoor air quality problems, including the growth of indoor fungi and molds, with increases in respiratory and asthma-related conditions. Manitoba has developed information and capacity to support residents with flood and moisture damaged buildings.
- 8. Supporting Vulnerable Populations** – Some individuals or groups may be more sensitive or more exposed to hazards related to climate change, including elderly persons, young children and disadvantaged socio-economic groups. Manitoba will continue to work with partners to identify and support vulnerable populations, and identify enhanced needs in relation to climate change impacts.
- 9. Reducing Mental Health Impacts** – Extreme weather events can affect mental health in a variety of ways. High levels of depression, anxiety and even post-traumatic stress disorder have been found among people affected by floods, heat waves, forest fires and other significant weather events. Secondary stressors encountered during recovery, such as dislocation or reduced access to needed services, can affect an individual's physical and mental health. A changing climate can also increase stress through loss of livelihood, and contribute to social disruption, and maladaptive behaviours such as substance abuse. Manitoba chairs a Provincial Psychosocial Planning Table (PPPT) consisting of key stakeholders engaged in response and recovery from disasters. The PPPT undertakes psychosocial planning and co-ordination for all hazards. The members of the PPPT also work co-operatively to identify and support populations that may be the most vulnerable to psychosocial impacts from extreme weather events, such as First Nations, the elderly, women, children or the homeless. Manitoba is also an active participant in Partners in Disaster (PID), an organization comprised primarily of nongovernmental organizations, which assist individuals and families after a disaster.
- 10. Adapting to Population Changes** – The warmer climate for Manitoba may lead to population increases and changes in human activities.
 - **Identifying Emerging Health issues** – A changing population structure may create new issues to address. Manitoba regularly assesses the health of Manitobans to determine emerging issues.
 - **Creating Healthy Communities** – With increases in population, planning is needed to create environments that enhance health and reduce the ecological footprint. Active living strategies, green space planning and community planning is underway.
 - **Enhancing Development Planning** – The potential human health impacts of new development proposals are assessed through the Environmental Impact Assessment process. A review to identify future needs regarding these assessments is planned.

Impacts of climate change on communities and health

A changing climate may affect the health of people and communities through exposure to extreme weather events (ex: floods; fires; tornados) as well as through changes to the natural and biological systems on which humans depend. Current projections indicate that the changing climate is expected to create warming conditions with a sharp increase in the number of extreme hot days within Manitoba, especially in southern urban regions. A changing climate may also bring an increase in precipitation for some areas of the province, especially in winter and spring; this may lead to more frequent and severe extreme weather events such as floods, while the threat of drought will likely increase as well.

Climate-related changes may also result in psychosocial impacts, affecting mental health and well-being of people and communities in both direct and indirect ways. In addition to environmental impacts, changes in local climates can affect cultural, social and economic systems.

Single extreme weather events can pose a risk to all communities. In some instances, highly vulnerable communities and individuals may be exposed to multiple climate-related events in close succession, thereby amplifying the psychosocial impact. For all climate-related risks, low-income and socially disadvantaged populations tend to be more adversely affected and have less adaptive capacity. Changing environmental conditions as a result of climate change will also affect the risks for emerging or re-emerging diseases. Changes in population and new development initiatives will have an impact on communities and health.

Spotlight on Aki Energy

Aki Energy is a non-profit First Nations social enterprise that specializes in setting up social enterprises on First Nations to undertake work in the green economy. Founded only three years ago, Aki Energy has installed over \$8 million in geothermal and solar thermal energy in four First Nations communities, generating about \$1 million in utility bill reductions annually. Aki has trained and employed 50 people to date. In 2015, Aki also started a healthy food social enterprise at the Garden Hill First Nation, which includes a successful 15 acre farm and healthy food market. This year, the farm raised 1200 chickens for local consumption and now sells \$20,000 of healthy food a month. For more information, go to www.akienergy.com





ENHANCING THE RESILIENCY OF MANITOBA'S INFRASTRUCTURE TO CLIMATE CHANGE

Manitoba has made significant investments in infrastructure, including roads, bridges, flood infrastructure and buildings. The 2014 federal report, *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*, indicates that well-maintained infrastructure is more resilient to a changing climate, in particular the more gradual precipitation and temperature pattern changes.

Manitoba's economy is dependent upon a resilient transportation system. This system must ensure essential products and services like energy, food, manufacturing, and trade are all functioning. Disruptions to transportation systems, including climate-related events such as floods, can cause large economic and personal losses.

It is becoming more evident that historical climate patterns cannot be the sole basis of infrastructure decisions. Consideration of future climate change impacts is required.

- 1. Identifying Infrastructure Best Practices** – Manitoba will assess best practices and lessons learned in improving the resiliency of our infrastructure to a changing climate. Measures to address these risks may include adaptations to infrastructure, policy adaptations, changes to operations and maintenance of infrastructure and climate data.
- 2. Protecting Manitoba's Winter Road Network** – Manitoba's winter road network has become increasingly vulnerable to annual temperature fluctuations, particularly on southern routes east of Lake Winnipeg. To extend and stabilize the winter road season, Manitoba has been relocating ice-roads onto land and building bridges over some river crossings. Since 2001, 25 per cent, or more than 600 kilometres of Manitoba's winter road system, has been moved from ice onto land.
- 3. Flood-proofing Infrastructure** – Manitoba will continue to invest in improvements to protect transportation infrastructure, including raising highways and bridges. This includes improvements to PTH 75 and through the East Side Transportation Initiative.



CREATING CLIMATE-RESILIENT LANDSCAPES: HELPING PLANTS AND ANIMALS ADAPT

A changing climate may cause additional stress to ecosystems and species, especially those currently endangered or threatened due to loss of habitat.

- 1. Protecting Rare and Endangered Species** – Manitoba will continue to monitor rare and endangered species, such as the woodland caribou and assess their vulnerability to changing climatic conditions including increasing heat, warmer winters, greater extremes and shifting habitats. Manitoba will also monitor invasive species and diseases that a changing climate may foster.
- 2. Preparing Government for a Changing Climate** – Manitoba will develop an internal climate change resiliency planning framework. This framework will be used to identify the risks and vulnerabilities that climate change poses to the delivery of government services and will include impacts to ecosystems, natural resources and infrastructure across Manitoba. These vulnerability and risk assessments will be followed by preparedness planning to identify key adaptation actions that will ensure efficient and effective program delivery in vulnerable areas under a changing climate.
- 3. Strengthened Fire Protection** – Manitoba continues to enhance its firefighting resources and wildfire suppression efforts through the use of new technologies and the modernization of our fleet of water bombers and other infrastructure to address the potential increase in frequency and severity of wildfires from a changing climate. The FireSmart and community wildfire protection plans will be strengthened in areas that have increased vulnerability to wildfires.
- 4. Reducing Human-Wildlife Conflict** – Climate change may lead to food scarcity for some wild animals, which in turn may lead to increased human-wildlife conflict. Manitoba will continue its efforts to educate the public on the importance of removing wildlife attractants and will provide wildlife depredation prevention and compensation programs to assist in mitigating agricultural conflicts with wildlife.



RECREATION AND TOURISM

A changing climate poses both risks and opportunities for the tourism and recreation sectors. A longer and warmer summer may encourage more recreational activities and tourism, while prolonged heat waves and drought conditions may hamper recreational pursuits, especially water-based activities.

- 1. Promoting Sustainable Tourism** – Manitoba will include sustainability as a key pillar as it moves forward with the development of its provincial tourism strategy. Consultation with the tourism sector will include discussions about the link between tourism and climate change and will help to collaboratively identify opportunities for increasing sustainability within the sector and growing green travel. This process will also provide opportunities to introduce businesses and community-based attractions to adaptation strategies that mitigate the impacts of a changing climate.
- 2. Best Eco-Practices** – Manitoba will share best practices and research in the planning, design, management and ecosystem monitoring of public recreation facilities, and help recreation leaders and organizations better understand and adapt to the implications of climate change.
- 3. See Manitoba Parks by Bus** – Manitoba will work with stakeholders to reduce the carbon footprint of travel to provincial parks. This could include partnerships with municipalities, school divisions and other public organizations for alternate use of their bus fleets on evenings and weekends. This will build upon existing relationships to further green Manitoba parks.



WATER RESOURCES AND CLIMATE CHANGE

Water is essential to all life and to the well-being of Manitobans. Clean water is critical for ensuring healthy ecosystems, sustainable communities and a prosperous economy. Manitoba is fortunate to have an abundance of fresh water, but our province is also prone to frequent floods and droughts that threaten the reliability of our water quality and supply. The impacts of climate change have already begun to be felt in Manitoba, as indicated by unusually severe floods in 2011 and 2014 and droughts in 2006 and 2008 in southern Manitoba. In the future, climate change is expected to increase the frequency and severity of floods and drought.

The high variability of water at different times and across diverse regions has prompted Manitobans to undertake many flood reduction efforts. These initiatives include the construction of dikes and levees. Such measures have helped to mitigate the economic and social harm caused by severe weather events. Evidence shows that our climate has warmed in recent decades, with trends indicating Manitoba will experience an extended temperature rise and changing precipitation patterns in the coming decades, which will increase the frequency, severity and unpredictability of severe weather events in southern Manitoba.

Climate change requires us to enhance our preparedness for future events by building on past successes and incorporating lessons learned. Moving forward, Manitoba will draw upon our experience to develop a more integrated, innovative and adaptive approach to water management. Conservation and efficient use of water will increase our resiliency and help us adapt to unstable water regimes.

Manitoba will demonstrate leadership and provide support for measures that build water security. Our future water security depends on enhancing our resiliency to, and preparedness for, a changing climate and the impact it will have on our rivers, streams, lakes, groundwater and aquatic ecosystems. These efforts will help ensure that the quality and quantity of water in Manitoba is sustainable, and that all Manitobans will continue to enjoy the benefits of one of our province's greatest resources.

1. Completing the Wetland Inventory – Manitoba will complete the inventory of wetlands and peatlands in the province as part of the national wetland inventory, and as a necessary underpinning to the no net loss of wetland benefits program and to all future integrated land-use and development planning initiatives. Research on and tracking of climate change/wetland interactions will be facilitated through the completion of this baseline inventory.

2. Manitoba's New Surface Water Management Strategy – Manitoba has committed to a more integrated approach to sustainable surface water management through the recent release of the Surface Water Management Strategy. This new approach is fundamental to Manitoba's social and economic future and is organized around three pillars for action:

- **Improving and Protecting Water Quality**
- **Preparing for Extreme Events**
- **Co-ordination and Awareness**



New integrated thinking about drainage aims to sustain prosperous agricultural, industrial and business sectors while protecting and improving the health and resilience of our watersheds. Reviving and enhancing the natural storage capacity and resiliency of watersheds will help to address flood, drought, and nitrogen and phosphorus run-off. The Surface Water Management Strategy provides the important underpinnings for adapting future water management to the changing climate. The initiatives within the Surface Water Management Strategy aim to balance economic and development needs with ecosystem protection and watershed resilience. The strategy provides critical mechanisms for strengthening collaboration and developing new tools and approaches to support climate change adaptation by ensuring that water is responsibly and effectively managed for now and for the future.

Key actions in the strategy include:

- **Implementing Basin-Level and On-Farm Water Retention and Storage Projects** – Manitoba will encourage the research and implementation of water retention approaches at both the on-farm and the basin-level scale to provide resilience in time of drought and extreme weather events.
- **Advancing Water Conservation** – Manitoba will improve water use efficiency among municipalities, businesses and agriculture, including expansion of the Water Soft Path approach, which focuses on decreasing water demand through regional drinking water systems and more efficient treatment processes. Greater water use efficiency will reduce costs and ensure adequate water supplies are available for key users, especially during a severe multi-year drought.
- **Preparing for Risk** – Manitoba will address the impacts of a severe drought through its Drought Management Strategy. The strategy will enable a science-based process for the declaration of drought and ongoing drought management and will encourage proactive drought management initiatives. Manitoba will lead these efforts by establishing drought reporting and monitoring systems, coordinating action between all levels of government, and providing support to help communities improve drought preparedness.
- **Sustainable Drainage** – Manitoba will introduce a regulation to encourage responsible drainage, ensuring conservation or restoration of wetlands through a no net loss of wetland benefits program, improving water retention structures and reducing the rate of run-off of water on the land. Greater water storage helps mitigate the impact of droughts and reduces floods and nutrient run-off during times of excess moisture. This will allow for more effective flood and drought management, while reduced nitrogen and phosphorous will promote healthier aquatic ecosystems.
- **Transboundary Cooperation** – Through organizations like the Lake Friendly Alliance, the Prairie Provinces Water Board and the Red River Basin Commission, we will engage stakeholders from across the nine jurisdictions of the Lake Winnipeg Basin, to work together to solve the complex issues surrounding ecosystem health of Lake Winnipeg, and other water bodies affected by climate-influenced water quantity and quality. Measures include enhanced collaboration and co-ordination; improved science, reporting and accountability; innovation and technology transfer; and sector specific and area-wide stewardship.



- 3. Fostering Ecological Goods and Services** – Manitoba will continue to foster the development of ecological goods and services (EGS), which are the benefits received from well-managed ecosystems, such as water storage and purification. Clean, abundant freshwater is a vital ecological good that is made more resilient by healthy wetlands, bodies of water and riparian areas. Increasing our understanding of the value of EGS in the context of climate change will help Manitoba decision-makers to develop and evaluate adaptive strategies that enhance the resilience of Manitoba’s natural capital to climate change.
- 4. Managing Aquatic Invasive Species** – Manitoba will continue to manage the impact of zebra mussels and other aquatic invasive species through inspections, enforcement and public education, as well as protocols for remediation to protect the health of Manitoba’s aquatic ecosystems. Building on previous investments, Manitoba has committed \$1 million to the fight against zebra mussels in 2016.
- 5. Looking Forward** – Manitoba will encourage communities to incorporate climate change projections into their planning processes through the development of Municipal Water Sustainability Plans that include a risk management approach. This will allow municipalities to effectively plan for potential reductions in water availability and quality.
- 6. Integrating Watershed Management** – Manitoba will emphasize an increased focus on climate-related watershed stressors during the development of the next Integrated Watershed Management Plans, and support innovative approaches that can be integrated into the watershed planning processes.
- 7. Accounting for Climate Extremes** – Manitoba will ensure the environmental assessment and licensing process requires a project proposal to address the potential impact of climate extremes as well as separately consider the impact of the project on the environment.



PREPARING FOR FUTURE CLIMATE IMPACTS IN THE NORTH

Manitoba's North is rich in cultural and natural resources. The impacts of climate change have already been felt in some northern communities, through warmer winters, changing seasonal patterns, more variable ice and changing traditional hunting, trapping and harvesting conditions. There have also been more disruptions to the rail line to Churchill due to summer melting of the permafrost. Collectively, these events have had detrimental impacts on northern and Indigenous people and communities, requiring enhanced resiliency.

Key actions to help prepare the North for the impact of climate change include the following:

- 1. Enhancing our Northern Transportation Network** – Manitoba will ensure reliable access among northern and Indigenous communities through a reliable transportation network.
- 2. Improving Northern Food Security** – Manitoba will continue to support food security for northern and Indigenous communities through the Northern Healthy Foods Initiative, ensuring cost effective and healthy local food production and storage.
- 3. Enhancing Training Opportunities** – Manitoba will enhance training and economic development opportunities to support innovation and skills that foster a transition to local energy sources and promote the development of eco-tourism and other tourism-related industries for northern and Indigenous communities.



- 4. Increasing Engagement and Awareness** – Manitoba recognizes the knowledge of northern and Indigenous communities on the impacts of climate change on spiritual traditions and traditional ways of life, such as hunting, trapping and other harvesting activities. We will use interactive approaches to support knowledge sharing, such as web-based or face-to-face public engagement, workshops or meetings with community leaders, to seek innovative, local solutions to climate challenges. We will integrate traditional and local knowledge with the best available and locally-relevant science. Use of climate models and scenarios will help communities to identify and assess their vulnerabilities and risks to climate change, and take steps to enhance their climate resilience and preparedness.
- 5. Supporting Off-Grid Communities** – Manitoba, Manitoba Hydro and the federal government are exploring options for greater self-sufficiency of northern and Indigenous communities through renewable electricity generation. Communities will reduce their energy costs, reliance on diesel for electricity and heating, GHG emissions and associated environmental impacts. This could provide less dependency on transporting fuel using winter roads. An important step will be consulting with each community about the best alternatives.
- 6. Assessing Climate Risk** – Manitoba will take measures to better understand the vulnerabilities and risks posed by a changing climate on northern and Indigenous communities. The assessment process will ensure evidence-based decision making through an integrated approach that uses the best available climate science and data and traditional ecological knowledge of observed changes from Elders and other community members. Use of data and information collection through Resource Management Boards would enhance these processes.
- 7. Developing Northern Partnerships and Collaborations** – Manitoba will develop stronger collaboration and partnerships with northern and Indigenous communities, government, academia, agencies and northern councils when seeking to adapt to a changing climate in the North. Developing and enhancing existing Resource Management Boards is a great platform for inclusion of all groups and dialogue on many topics.



CHARTING AND REPORTING OUR PROGRESS

Charting progress and success on climate change policies and programs can provide policymakers and stakeholders with timely information on the effectiveness of interventions, and allow changes to be made when needed. Monitoring, reporting and evaluation tools can help to identify success factors and barriers and inform the design of more effective policies in the future by identifying best practices.

Manitoba will provide regular reports on its progress and will develop robust indicators to measure environmental protection, economic prosperity and social well-being. Areas of reporting will include, but are not limited to, the following indicators.

THEME	AREA	INDICATOR
Environmental Protection	Energy	Fossil fuel consumption
		Fossil fuel intensity
		Fossil fuel consumption per capita
	Water	Water quality index
	Climate change	Greenhouse gas emissions
		Production based GHG emissions
	Waste	Waste disposal
Air quality	Canadian Ambient Air Quality Standards	
Economic Prosperity	Transportation	Energy consumption of transportation
		GHG emissions from transportation
	Buildings	Energy intensity of buildings
	Jobs	Number of green jobs
		Emission intensity of jobs
Social Well-being	Health	Premature mortality rate
	Education	Number of schools with sustainable development incorporated into school plans



CONCLUSION

Climate change is the defining environmental, economic and social issue of our time. The time is now to reduce GHG emissions, adapt to new climatic realities and proactively create a low-carbon economy that benefits all communities.

Manitoba is already a leader in the development of clean, renewable hydroelectric power. We export this power to our neighbours to reduce their use of carbon-intensive forms of energy, thereby reducing overall GHG emissions. We have also seen the development of two world-class wind farms producing clean electricity in St. Leon and St. Joseph. Manitoba is also a leader in geothermal heat and in First Nations geothermal installations through Aki Energy. Our innovation is also displayed through the development and use of our made-in-Manitoba all-electric battery buses.

We are investing in winter road infrastructure and local food production to support and sustain northern and remote communities. Manitoba will continue to work with farmers and municipalities to support sustainable practices and to adapt to a changing climate. We are taking action to conserve our intact boreal forest by protecting areas like Pimachiowin Aki, currently under consideration as a UNESCO World Heritage site that promotes conservation of a natural landscape that also sequesters carbon.

Manitoba is already on a path to a low carbon economy, and we are well positioned to become carbon neutral by 2080. We will continue to work with our provincial, regional, national and international partners to build on our strengths and address new opportunities in our need to reduce GHG emissions while focusing on prosperity, people and our collective future.





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