Kyoto and Beyond

A plan of action to meet and exceed Manitoba's Kyoto targets

Manitobans are clearly concerned about climate change but they are also ready with innovative ideas to meet the many challenges that climate change presents to us. The Manitoba Climate Change Action Plan 2002 is the next step in Manitoba's efforts to take meaningful action to combat climate change.

Kyoto and Beyond

Province of Manitoba Climate Change Action Plan | 2002

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MESSAGE FROM THE PREMIER

Scientific consensus from around the world and our own experience in Northern Manitoba tells us that changes in our climate are already underway. Weather in Manitoba is becoming less predictable. As a result, our northern and Aboriginal communities, in particular, are coping with unreliable winter roads and changes to traditional ways of life on the land. We are also seeing serious changes in the health and well-being of our polar bear population. All of these indicators tell us that we simply cannot afford to wait to take action on the very serious issue of climate change.

In March of 2001, our government commissioned the Climate Change Task Force, chaired by the Honourable Lloyd Axworthy, to conduct public consultations in Winnipeg, Brandon and Thompson. During the consultations, citizens, interest groups and organizations clearly supported taking action to deal with the many serious climate change challenges we face. Recommendations ranged from calling on Canada to support the Kyoto Protocol to taking advantage of new opportunities in renewable energy and transportation to protecting carbon sinks in our agricultural and forested regions. I was pleased to accept the public recommendations presented to me in the fall of 2001 by the Manitoba Climate Change Task Force and I am pleased to present this action plan based on those recommendations. We know that there will continue to be innovative recommendations from the public on this issue and we will continue to add initiatives to our plan, knowing that local and global responses to climate change are works in progress.

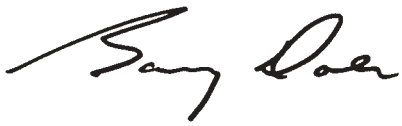
Our government has expressed strong support for the ratification of the Kyoto Protocol that calls for a 6 per cent reduction of greenhouse gas emissions from 1990 levels by 2012 in Canada. We believe this to be a critical first step in reducing greenhouse gas emissions worldwide and we are committed to helping Canada meet its Kyoto targets. That is why we are presenting an action plan that will allow Manitoba to meet and exceed the Kyoto Protocol targets early, by 2010, so that we can contribute to helping Canada meet its Kyoto targets on time.

Manitoba has many natural advantages that help us achieve this goal that are highlighted at the beginning of this plan. We rely on electrical energy that produces little or no greenhouse gas emissions. We can build on our hydro-electric capacity and work towards becoming a centre of excellence for hydrogen-based fuels that may someday power a new world economy. Manitoba has similar potential to become a leader in ethanol-based fuel production that will cut carbon emissions and add incredible diversification opportunities for agriculture. By taking a lead in developing the technologies to support the hydrogen era, Manitoba will benefit from associated educational, training and business development opportunities that have already begun to emerge. We are committed to working on a national plan with the federal government that includes these initiatives as well as an east-west electric power grid. In doing so, we can help to set the stage for a new, exciting and more sustainable economy in Canada.

Manitobans are clearly concerned about climate change but they are also ready with innovative ideas to meet the many challenges that climate change presents to us. Through our action plan we are taking an active part in the global effort to reduce harmful atmospheric emissions. In the process, we will take advantage of opportunities that arise for research, development and commercialization of clean-environment technologies.

I invite all Manitobans to join me in this effort to leave a legacy of clean air and clean energy for our future generations.

Yours truly,



Gary Doer
PREMIER

MESSAGE FROM THE MINISTER OF CONSERVATION

In my government's first two years in office, we have moved quickly to lay a foundation for meaningful action to address serious challenges posed by climate change. I am extremely concerned by the changes I see happening in Northern Manitoba where I live. Northern and Aboriginal people who practice traditional lifestyles and rely on the land for their livelihoods face great adversity in adapting to the slightest changes in climate.

Manitoba Conservation is working with other departments, agencies, academic institutions and the Manitoba public to address the challenges of climate change. We have funded and participate in a climate change public awareness hub (The Climate Change Connection) along with environmental groups, Manitoba Hydro, municipal officials, the Lung Association and many, many other representatives. We are promoting the use of hybrid vehicles, improved energy-efficiency, waste reduction and recycling as well as innovation through the Manitoba Climate Change Action Fund that was established in January, 2001. Within government, we have created a Climate Change Branch to co-ordinate our efforts and to raise the profile of this important issue. In addition, The Manitoba Round Table on Sustainable Development is playing an active role in advising our government on climate change issues.

I am pleased that, through the efforts of the Clean Environment Commission and the International Institute for Sustainable Development, a public forum was held in January 2001 for citizens, groups and business people from all areas of our province to hear experts discuss climate change and begin seeking opportunities for action.

The Manitoba Climate Change Action Plan 2002, based on the recommendations from our Task Force, is intended to be a living document that confirms my government's commitment to action, reports back on accomplishments and sets a direction for priority action. We will continue to consult and work with Manitobans to accomplish the priorities set out in this plan and set a future course to continually build upon this plan.

Please consider how you can be a part of this important effort.

Yours truly,

Oscar Lathlin
MINISTER OF CONSERVATION

1. CONTEXT OF ACTION PLAN

The Manitoba Climate Change Action Plan 2002 is the next step in Manitoba's efforts to take meaningful action to combat climate change. Readers of this document may be aware of, or may have participated in, the 2001 task force or the 2001 public forum on climate change. Discussion among climate experts and public input during these forums helped shape Action Plan 2002.

This plan is a commitment to Manitoba's ambitious goal of meeting and exceeding Canada's Kyoto Protocol targets for greenhouse gas emission reductions. It contains proposals on how this goal can be achieved and it contains an accounting of accomplishments and new programs intended to address the many challenges posed by climate change.

The Manitoba government is committed to acting in partnership with our citizens, institutions, provinces and territories and the federal government to increase our knowledge of climate change. We will also strive to be on the leading edge of technological advances to ensure reduction of harmful emissions and to pursue business opportunities that help others reduce their emissions. Knowing all we can about the causes and anticipated impacts of climate change will allow us to make better decisions.

Documents available at:
www.gov.mb.ca/conservation/climatechange

2. WHAT IS CLIMATE CHANGE AND HOW MIGHT IT AFFECT US?

Around the world, our climate is changing. Average global temperatures are rising — the 20th century was the warmest the world has seen in 1,000 years. The 1980s and 1990s were the warmest decades on record.

Human activities are upsetting the balance of greenhouse gases, such as carbon dioxide, in our atmosphere. Heavy use of fossil fuels for heating and transportation releases carbon dioxide and other greenhouse gases. These gases accumulate in the atmosphere causing the earth to heat up. Most climate change projections for the prairies show an increase in temperature under global warming. In fact, recent research suggests that summer temperatures in Manitoba could increase by 3–4°C by 2080. Winter temperatures could increase by 5–8°C. Such changes will be the largest and most rapid of the last 10,000 years and will have profound effects on our lives and the ecosystems that support us. The following information includes details of how global warming may affect us.

Changing Weather Patterns

Extreme weather such as thunderstorms, tornadoes, hailstorms, heat waves and droughts may become more frequent on the prairies due to climate change. Warmer winters may increase the potential for more intense winter storms and more frequent rain. In the spring, flooding may increase with heavy rains. Earlier spring runoff, increases in summer temperatures and decreased summer rainfall may result in low summer water flows and increased occurrence of drought conditions.

Water

Because of warmer temperatures and unpredictable water volumes of rivers and lakes in the summer, Manitoba's water quality may be in jeopardy. If the volume of surface water decreases, pollution levels could increase. In spring, increased surface water could put more pressure on our infrastructure and flood protection system. It could also lead to overland flooding and subsequently increased levels of pollution.

The Changing Face of Agriculture

More frost-free days will mean a longer growing season and a greater range of crops available to producers; however, Manitoba farmers can expect to see declines in summer precipitation of 10–20 per cent and higher evaporation. As well, climate change could lead to increased heat stress on animals and plants in summer but decreased risk of cold stress in winter. Warmer winters could reduce the amount of winter-kill of fall-seeded crops, but might also reduce the winter-kill of some weeds and insects.

Our Forests

Manitoba forests will be more susceptible to wildfires and pests during the summer. Forest habitats will begin to spread northward but it may be many thousands of years before northern soils will develop the ability to support the growth of more southerly forest species. The interim effect could be a drastic reduction in the size of heavily forested areas of our province.

Health and Welfare

Climate change will cause individual Manitobans to experience many changes that will affect their health and welfare. Health-related effects like higher incidence of heat stress and allergies, as well as increased vulnerabilities to new diseases and pests may result. Changes to, or the loss of, traditional ways of life will particularly affect First Nations, Aboriginal and northern communities.

Life in the North

Northern communities could experience warmer temperatures throughout the year. Warmer weather may provide an opportunity for an extended shipping season at Churchill. Communities dependent on ice roads will face severe challenges. Warmer temperatures will lead to the deterioration of ice roads built upon lakes and bog and thawing of permafrost will place foundations, roadways, railways and other infrastructure at risk.

POLAR BEARS ON THIN ICE

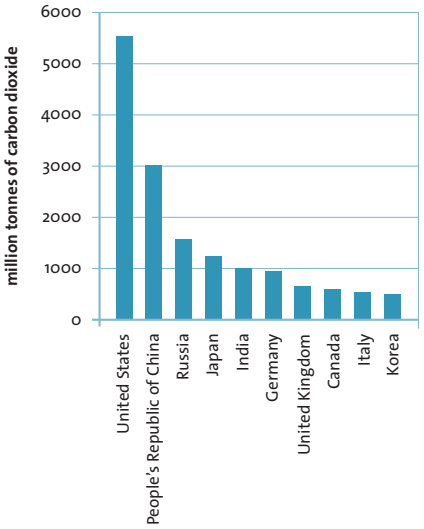
Warmer temperatures will cause earlier break up of ice on Hudson Bay. This will force polar bears to come ashore earlier, limiting their hunting opportunities. Recent trends suggest that this is already occurring in the Western Hudson Bay Region. Since 1981, the health of adult polar bears in the Region has declined significantly because the bears have less time on the ice to feed on seals before beginning their annual fast. Polar bears lose 10 kilograms in body weight for each week they can't hunt.

3. WE BELIEVE

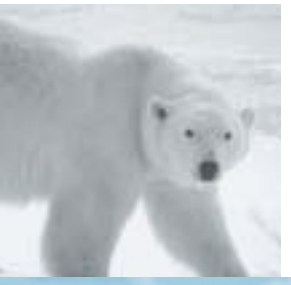
In its commitment to action the Government of Manitoba acknowledges the following:

- Climate change is a real and pressing problem for Manitoba and all areas of the world.
- Adverse effects on our land and way of life are being seen now in our communities.
- Opportunities exist to develop innovative ways to reduce greenhouse gas emissions and assist in adapting to the changes that have begun to occur.
- Although Manitoba's contribution to Canada's emissions is small, it is important for us to lead by example in reducing our emissions. This is especially important if we hope to engage developing nations in emission reductions in the future.
- The Kyoto Protocol and the Framework Convention on Climate Change represent the only mechanism currently available to keep nations from around the world engaged in a process that will combat the serious risks posed by climate change.
- The emission reductions required by the Kyoto Protocol are only a modest beginning for what must be done to try and stabilize the harmful changes that are now being caused in our environment by climate change.
- As part of our commitment to sustainable development and protection and stewardship of our resources for future generations, it is our moral obligation to take all reasonable steps now to reduce emissions and begin adapting to the changing climate.

TOP TEN CARBON DIOXIDE EMITTING NATIONS[1] (emissions from fuel combustion) 1999



1. Source: International Energy Agency. 2001. *CO_2 Emissions From Fuel Combustion 1971–1999*. Paris: IEA Publications, pp. II.4–II.9.



4. A COMMITMENT TO ACTION AND RECORD OF ACHIEVEMENT

On June 19, 2002, the Premier announced Manitoba's intention to meet and exceed Kyoto Protocol reduction targets as a part of a national greenhouse gas reduction strategy. This commitment represents the highlights of Manitoba's overall action plan that will contribute to a national approach to meet Canada's Kyoto target.

Manitoba's Net Contribution to Canada's Kyoto Commitments to Exceed Target by 2010

By 2010, Manitoba's net contribution could equal a greenhouse gas reduction of up to 18 per cent from 1990 levels — significantly more than the six per cent obligation faced by the nation as a whole. These achievements will be possible when the right conditions and market price signals are put in place to make renewable energy sources more economically attractive than fossil fuels.

Renewable Electricity

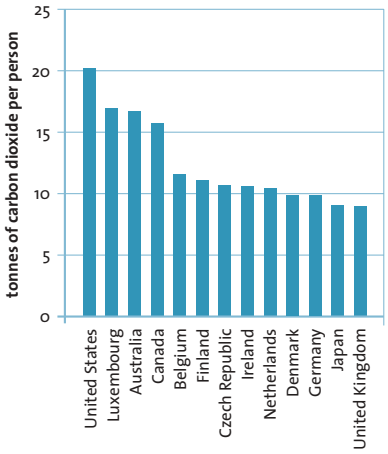
Increased exports to the U.S. and elsewhere in Canada — based predominately on hydro-electricity but also on energy conservation and wind generation — could provide reductions of about 4.25 megatonnes (Mt) per year by 2010.[1]

For example: The Wuskwatim Hydro Generation Project on the Nelson River is expected to cut greenhouse gas emissions by 1.1 Mt per year and create up to 7,700 person-years of employment. The facility could be in service by 2009. The Nisichawayasihk Cree Nation is a partner with Manitoba Hydro on this project.

Selkirk Conversion

Manitoba Hydro has switched the source of fuel at its Selkirk generating station from coal to natural gas. This initiative alone will cut emissions by 0.2 Mt per year.

MAJOR CARBON DIOXIDE EMITTING OECD NATIONS[2] (emissions from fuel combustion per person) 1999



1. These reductions are based on the displacement of coal and gas generation in export markets. These estimates assume Canada receives the Clean Energy Export Credit for exports to the U.S. and that Manitoba negotiates a 50 per cent share of the emission reduction credits resulting from exports to other provinces.

2. Source: International Energy Agency. 2001. *CO_2 Emissions From Fuel Combustion 1971–1999*. Paris: IEA Publications, pp. II.76–II.77.

Ethanol

The Manitoba government has announced its intention to require the blending of ethanol at 10 per cent in all gasoline sold in the province. This initiative alone will reduce emissions by over 0.135 Mt per year and create up to 900 direct and indirect jobs in Manitoba.

Methane Capture

Methane from rotting organic matter in landfills is a major source of greenhouse gas emissions. Winnipeg's Brady Road landfill is Canada's largest and most cost-effective remaining site for capturing methane. Capturing the biogas emitted from Manitoba landfill sites could reduce emissions by 0.4 Mt per year. The gas could be used to create 6.7 MW of electricity.

Industry Targeted Measures

A series of targeted measures with agriculture and other sectors, cost-shared with the federal government, could offer emission reductions and sequestration or sinks credits of about 4.5 Mt per year.

Manitoba's Net Contribution to Canada's Kyoto Commitments to Exceed Targets Again by 2012

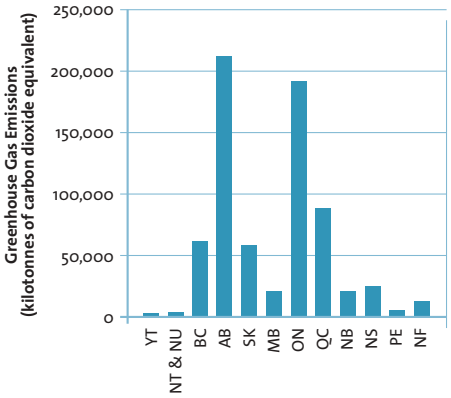
By 2012, Manitoba's net contribution could equal a greenhouse gas reduction of up to 23 per cent from 1990 levels, provided the right conditions are in place.

Renewable Electricity

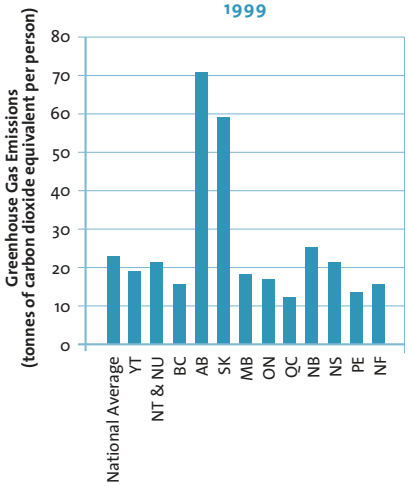
Increased exports to the U.S. and elsewhere in Canada — based predominately on hydro-electricity but also energy conservation and wind generation — could provide about 5.55 Mt of reductions per year by 2012.

For example: The Gull Hydro Generation Project on the Nelson River is expected to cut emissions by 3.3 Mt per year and create up to 18,300 person-years of employment (direct and indirect). This 623 MW facility could be in service by 2012. Manitoba Hydro and four Cree First Nations are working towards partnering on this project.

PROVINCIAL AND TERRITORIAL GREENHOUSE GAS EMISSIONS[3]
1999



PROVINCIAL AND TERRITORIAL GREENHOUSE GAS EMISSIONS PER PERSON[4]
1999



3. Source: Environment Canada. Pollution Data Branch. 2002. "Canada's Greenhouse Gas Inventory, Factsheet 1, Overview 1990–1999". January, 2002. http://www.ec.gc.ca/pdb/ghg/ghg_docs/FS99OVRENWeb.pdf

4. Source: Environment Canada. Pollution Data Branch. 2002. "Canada's Greenhouse Gas Inventory, Factsheet 1, Overview 1990–1999". January 2002. http://www.ec.gc.ca/pdb/ghg/ghg_docs/FS99OVRENWeb.pdf

Manitoba Hydro's Power Smart conservation programs alone (not taking into account changes in building codes) are expected to save 237 MW and 988 Gwh by 2011/12. These savings will result in reductions of about 0.75 Mt per year in the year 2011/12. This initiative creates more than 150 jobs in Manitoba each year. These energy savings are included in Manitoba Hydro's projected exports.

Ethanol

The market for ethanol is expected to continue to grow in both the U.S. and Canada. Manitoba's cost of production will be among the cheapest in North America. Manitoba production is expected to reach at least 400 million litres by 2012, cutting emissions by 0.39 Mt per year.

Ground Source Heat Pumps (GSHP)

Manitoba, with little promotion, has 14 per cent of Canada's ground source heat pump installations. Natural Resources Canada has identified GSHP installations as the most cost-effective way to heat and cool buildings. Manitoba Hydro has launched a program to finance the purchase and installation of the equipment. The owner of an average-sized house can save $400 to $1,400 per year, depending on current fuel source. Doubling the number of installations in Manitoba by 2012 will save 0.02 Mt of greenhouse gas emissions per year.

Federal Government Adopting the Manitoba Approach

Manitoba believes the federal approach should include three core elements:

Hydro

Federal studies have shown that developing Canada's hydro-electric capacity is the single most cost-effective way of using existing technology to reduce greenhouse gas emissions in Canada.

Notional estimates show, for example, that if the federal government supported an east-west power grid, more than 20 Mt of greenhouse gas emissions per year would be displaced, creating as many as 175,000 person-years of employment in construction alone. The project could also create significant economic development opportunities for Canada's First Nations.

Ethanol

Mandating the use of ethanol across Canada and providing incentives at levels similar to those available in the U.S. would cut emissions by 3.8 Mt per year and create 5,000 jobs.

Energy-efficiency

In January 2000, Manitoba Hydro launched enhancements to its Power Smart program to help Manitoba families and industry save energy. If Manitoba Hydro's Power Smart programs and benefits were emulated across Canada, greenhouse gas emissions would be cut by roughly 15 Mt per year and up to 5,000 jobs would be created.

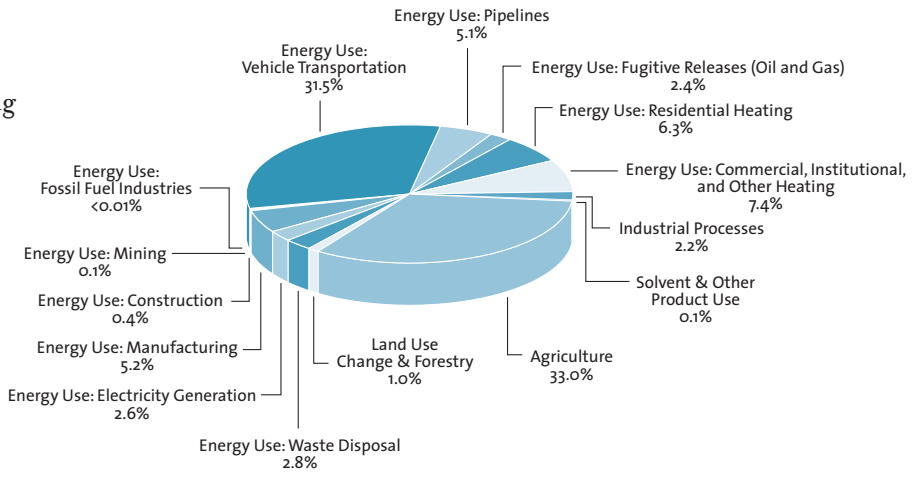
These are only three of many initiatives the federal government could sponsor across Canada to create jobs while helping the environment.

Manitoba's Record of Achievement

Manitoba's Climate Change Action Plan is a measured approach that builds on past accomplishments in addressing climate change in Manitoba. In the last few years, the Manitoba government has pursued a variety of climate change actions. Each of these actions has contributed in some way to addressing climate change. As a consensus developed that climate change impacts will be felt in Canada, the Manitoba government increased its efforts to address this growing challenge. Climate change related actions have been grouped under the following five categories:

1. Government Leading by Example
2. Investing In Knowledge
3. Promoting Technology, Development and Innovation
4. Enhancing Awareness and Understanding
5. Encouraging Action in All Sectors

MANITOBA 1999 GHG EMISSIONS ESTIMATES[5]
(CO_2 equivalent all gases)



5. Source: Environment Canada. Pollution Data Branch. Greenhouse Gas Division. 2001. *1990–1999 Greenhouse Gas Emission Estimates For Manitoba.* August, 2001. http://www.ec.gc.ca/pdb/ghg/ghg_docs_e.cfm

Government Leading by Example

To respond to climate change, the public sector needs to be fully engaged. Taking actions within our own operations to reduce greenhouse gas emissions sets an example for other sectors and can serve to open niche markets for new technology and innovation across the province. There are numerous opportunities for government to show leadership and create a path for others to follow. In many cases, actions taken can increase productivity and reduce long-term costs.

A variety of efforts are underway within government and Crown corporations to reduce greenhouse gas emissions from operations and to address climate change impacts. One of the most notable actions is Manitoba Hydro's current conversion of a coal-thermal power plant to natural gas, which has lower greenhouse gas emissions. Manitoba Conservation has also acquired two hybrid electric vehicles as a pilot project and some areas of government require use of ethanol fuel and more fuel-efficient fleet vehicles. The province has begun implementation of greenhouse gas mitigation plans through its procurement policies first announced in December of 2000. An example of this commitment to procurement is the advanced energy-efficiency standards adopted in the construction of new capital projects such as the new Red River College downtown campus. The sustainability design features in the campus have led to a nomination for an international award.

Manitoba Conservation

Manitoba Municipal Efficiency Program	In co-operation with the Association of Manitoba Municipalities, energy and water conservation audits were offered on which to implement energy, water and greenhouse gas reduction projects.
Manitoba Climate Change Action Fund (listed under all categories)	The Manitoba Climate Change Action Fund (MCCAF), a component of the Sustainable Development Innovations Fund (SDIF), is allocated $250,000 annually to support projects focusing on public education and outreach; the scientific understanding of climate change effects and potential adaptation practices; technological innovation (research and commercialization); and energy-efficiency and alternative or green energy. Priorities for funding areas will be reviewed on an annual basis. In addition, the SDIF also provides $550,000 annually for waste reduction projects that help reduce greenhouse gas emissions (listed under Encouraging Action in All Sectors category).

Manitoba Conservation (continued)

Hybrid Vehicle Pilot Program	Currently operating two hybrid electric passenger vehicles, documenting their performance, and making the information available on the Web and during 2001 at public events. Increased fuel efficiency of 39 per cent in city driving and 35 per cent in highway driving has been calculated over a similarly operated gasoline vehicle.
Hybrid Vehicle Public Outreach	Web site and pamphlets provide information on hybrid electric vehicles in general while highlighting our pilot program evaluation of two hybrid electric vehicles by the Climate Change Branch. Vehicle driver evaluation data was collected from October 2000 to October 2001 and a report on the performance of the vehicle is in preparation. Public events at shopping malls and schools were used to promote this technology in 2001.
Manitoba Conservation Vehicle Replacement Program	At time of vehicle replacement, vehicles are specified so the most efficient vehicle in its class is purchased, unless vehicle use requires a different configuration.
Implementation of COSDI Report (Consultation on Sustainable Development Implementation)	The COSDI Report was adopted in 2000 and recommends ecosystem-based planning. The province has engaged in broad area planning on the east side of Lake Winnipeg. Sustainability planning is also being completed for the Capital Region, forestry and water management.
Next Steps: Priorities for Manitoba's Forests	Sustainable Forest Strategy including the development of an ecologically based forest inventory and continued partnership in the Sustainable Forest Management Network and the Centre for Forest Interdisciplinary Research (CFIR). East side of Lake Winnipeg planning and new co-management initiatives would also be a part of this strategy — promoting a sustainable forest economy and including First Nation and Aboriginal communities as partners in this strategy. Carbon sequestration could be reviewed through the analysis of Provincial Forest Inventory databases.
The Sustainable Development Act	Within the Manitoba government the procurement of all goods, materials or services must be consistent with Manitoba's principles and guidelines of sustainable development. The Act requires goals, action plans and reporting to ensure results. Reducing greenhouse gas emissions and purchasing less carbon-intensive goods is a part of this effort. Financial management guidelines and a Code of Practice also ensure that critical management tools across government all bolster climate change activities.

Manitoba Family Services & Housing

Renewable Energy Technology Upgrades	Work is underway to implement renewable energy technologies in properties managed by the Manitoba Housing Authority to showcase solar and geothermal heating technologies.

Manitoba Finance

New Legislation to Expand Manitoba Hydro's Conservation Mandate	New legislation to promote other renewable resources including power generated from wind, solar and waste biogas.

Manitoba Hydro

Environmental Dispatch Premium	Development and application of an internal environmental dispatch premium. The net result of the premium is to reduce the operational use of thermal resources that produce emissions.
Selkirk Generation Station Conversion	In addition to the four coal-fired units in Brandon already retired, the two coal-fired units at Selkirk are being converted to natural gas in 2002. Relative to continued coal operation, this represents a reduction in emissions of 0.2 Mt/year at Selkirk alone.
Hydro-electricity exports	In 1990/91 Manitoba Hydro had net electricity exports of over 3,000 GWh. By 2000/01 net annual exports had reached over 11,000 GWh. This exported energy displaced extra-provincial generation that would have been produced using fossil fuels. The increase in exports has contributed and will continue to contribute to a significant global reduction of greenhouse gas emissions.
Voluntary Challenge and Registry	Canada's Climate Change Voluntary Challenge and Registry Inc. has recognized Manitoba Hydro as a gold level champion for its 2001 Climate Change Action Plan Update. The award represents the highest level of achievement in the organization's champion reporting system. Centra Gas was recognized as a silver level champion for its 2001 Climate Change Action Plan Update.
Implement a New Fleet Management (M4) System	A new fleet management system provides better preventive maintenance scheduling and tracking. This ensures vehicles are maintained at an optimum level, resulting in reduced breakdowns and fuel consumption and reduced greenhouse gas emissions.
Technical Measures Related to Natural Gas Transportation (Centra)	Various technical measures related to minimizing operational venting of natural gas and fugitive natural gas emissions are being implemented. Upgrading of equipment as well as new operational standards for venting and flaring natural gas have been implemented in the past and are part of ongoing measures aimed at greenhouse gas reduction.

Manitoba Intergovernmental Affairs

Canada-Manitoba Infrastructure Program	The new Canada-Manitoba Infrastructure Program involves $180 million investment in Manitoba's urban, rural and northern municipal infrastructure. Projects could potentially lead to greenhouse gas reductions where they reduce solid waste or increase energy-efficiency. The program's primary focus is green municipal infrastructure.

Manitoba Transportation & Government Services

Transportation Greenhouse Gas Strategy and Action Plan	Greenhouse gas reduction strategy and plan for reducing emissions in government operations and in the transportation sector.
Sustainable Development Planning and Implementation Team	Team dedicated to implementing sustainable development policies and practices within Manitoba Transportation and Government Services. These policies and practices include increased energy-efficiency for transportation and buildings and a reduction in solid waste generation that will reduce greenhouse gas emissions.
Energy and Environmentally Efficient Design for New Red River College Downtown Campus	Red River College's downtown campus is being constructed for improved energy-efficiency through an integrated design involving all consultants and energy simulation to achieve high energy-efficiency. The building is expected to be partially open in September of 2002 (Phase 1) and be fully open by December of 2003.
Greenhouse Gas Emissions Inventory of Government Facilities and Operations	Work has begun to confirm a 1990 baseline and to create a means to track annual emissions. When a baseline is confirmed and emissions tracking begins, an emissions reduction target will be established for government facilities and operations.
Sustainable Development Procurement Workshops	A series of workshops are required by Manitoba's Sustainable Development Procurement Guidelines. Workshops will be organized by Manitoba Transportation and Government Services and the Centre for Indigenous Environmental Education (CIER).

Investing in Knowledge

Knowledge is the cornerstone on which progress to mitigate and adapt to climate change will be built. Although a greater understanding of climate change has been achieved in recent years, significant work remains. Currently an increased focus on the regional and sectoral impact in Manitoba is required. There is a lack of understanding of how the different sectors of our economy, society and environment will be affected. The Manitoba government has begun to address this by funding research in areas such as agriculture, forestry and fisheries.

Manitoba is also supporting research that will help address more basic questions, such as the long-term regional climate record which could assist in regional climate change projections. Manitoba Industry, Trade and Mines and the Manitoba Climate Change Action Fund, along with Natural Resources Canada, support research into using tree rings to determine a high-resolution climate record for Manitoba. This is among a number of actions that attempt to understand the implications of climate change in our province.

Manitoba has collaborated in a national effort to produce a framework for effects and adaptation research. A Manitoba climate change impacts and adaptation research network is being established at the University of Winnipeg to coordinate efforts and implement the framework. This endeavour is being sponsored by the federal government and the Manitoba Climate Change Action Fund through the Prairie Adaptation Research Collaborative, which serves as a regional link to national research efforts.

Manitoba Agriculture & Food

Agricultural Research Related to Climate Change (also listed under Promoting Technological Development and Innovation)	There are a number of new research projects in the province addressing the various aspects of climate change on agriculture. Manitoba Agriculture and Food provides a grant to support research at the University of Manitoba. The Agriculture and Research Development Initiative is also available to encourage innovation in research.
Manitoba Crop Insurance Corporation (MCIC) Review of Crop Insurance Strategies	Review of strategies that will address the challenge and opportunity of climate change. For example, Manitoba Crop Insurance Corporation is considering options for managing risk as adaptation occurs to climate change.

Manitoba Conservation

Manitoba Climate Change Action Fund (listed under all categories)	The Manitoba Climate Change Action Fund, a component of the Sustainable Development Innovations Fund, is allocated $250,000 annually to support projects focusing on public education and outreach; the scientific understanding of climate change effects and potential adaptation practices; technological innovation (research and commercialization); and energy-efficiency and alternative or green energy. Priorities for funding areas will be reviewed annually.
Sustainable Forest Management (SFM) Network	The SFM Network is a unique university-based organization that supports multidisciplinary research to find better ways of managing the boreal forest through collaboration with governments, industries, universities and First Nations. The Manitoba Forestry Branch became a partner in the SFM Network on April 1, 2001. The SFM network is currently supporting four projects focused on carbon dynamics and/or climate change in the boreal forest.

Manitoba Conservation (continued)

Lake Winnipeg Commercial Fishery Study	Analysis of statistical data from models for climate change effects while accounting for fishery effects on abundance of fish (whitefish, walleye, sauger).
Manitoba Impacts and Adaptation Research Network	A Manitoba co-ordinator for the Prairie Adaptation Research Collaborative (PARC) will be established to help researchers and key decision-makers compose a strategic plan for adaptation research and to integrate Manitoba activities into regional and national work through PARC. As an example, adaptation research could include research into means of adapting to potential changes in the permafrost on northern infrastructure such as roads, transmission lines, pipelines and other structures.

Manitoba Hydro

Landfill Gas Utilization Study	Funding of a pre-feasibility study of the potential for reducing greenhouse gas emissions from City of Winnipeg landfill sites. In addition to flaring of landfill gas, the study also considered use of the gas for heating and electrical generation.
Wind Resources Study	Several measures are being undertaken regarding a potential wind turbine demonstration project. Information on current wind energy costs, wind resource assessment and site selection methodology is being collected with funding from Manitoba Conservation and the Energy Development Initiative of Industry, Trade and Mines.
Reservoir Emission Studies	Expanded studies involving the Freshwater Institute are seeking to determine the greenhouse gas emissions attributable to hydro reservoirs in Manitoba.

Manitoba Industry, Trade & Mines

Development of High-resolution Records of Climate Change in Southern Manitoba for the Last 1,000 Years	The information stored in natural archives such as tree rings and lake sediments can extend our current instrumental records of temperature, precipitation and stream flow 10,000 years into the past. Initial results from this research include high-resolution records of annual precipitation and extreme flooding in south-central Manitoba since AD 1409. This data is directly relevant to agricultural drought and groundwater supply projections, flood protection planning and forecasts for future hydro-electric resources.

Manitoba Transportation & Government Services

Transportation Options Research at the University of Manitoba Transport Institute	Contracted University of Manitoba Transport Institute to research options to reduce transportation-generated greenhouse gas emissions in Manitoba.
Heavy Trucking Greenhouse Gas Emissions Baseline	Research and develop modelling tool to improve estimate of greenhouse gas emissions from Manitoba's trucking industry fleet.

Manitoba Transportation & Government Services (continued)

Northern Transportation and Climate Change Trends	Climatological and statistical trend analysis of climate data will be conducted in partnership with the Prairie Adaptation Research Collaborative (PARC).
Prairie Adaptation Research Collaborative	Co-represents Manitoba on the PARC technical steering committee.

Manitoba Conservation

Manitoba Climate Change Action Fund (listed under all categories)	The Manitoba Climate Change Action Fund (MCCAF), a component of the Sustainable Development Innovations Fund (SDIF), is allocated $250,000 annually to support projects focusing on public education and outreach; the scientific understanding of climate change effects and potential adaptation practices; technological innovation (research and commercialization); and energy-efficiency and alternative or green energy. Priorities for funding areas will be reviewed annually.
Ethanol-blended Diesel Fuel Demonstration	Six-month trial of ten buses using ethanol-blended diesel fuel. Manitoba Conservation is the project facilitator. Project partners include Husky Oil Ltd. and City of Winnipeg Transit.

Promoting Technology Development and Innovation

Beyond investing in new knowledge, there is a need to take ideas developed here and elsewhere, and apply them in Manitoba. Many of these new technologies will make it easier to mitigate and adapt to climate change. As well, the increasing demand for climate change related technologies and services will create opportunities for Manitoba businesses. This is the time for taking advantage of these developing markets. Government will work with business and the academic world to maximize the benefits to Manitobans. The Manitoba Climate Change Action Fund is just one way government is addressing climate change. Funds are available for researchers, businesses and organizations for a variety of purposes, including technological research and development where the work relates to climate change mitigation and adaptation. The first field trial of its kind in Canada is being conducted with Winnipeg Transit to test the performance of ethanol-blended diesel fuel. Manitoba has also embarked upon an aggressive wind energy program by undertaking a wind resource mapping study sponsored by the Manitoba Climate Change Action Fund and the Energy Development Initiative.

Manitoba Agriculture & Food

Agricultural Research Related to Climate Change (also listed under Investing in Knowledge)	A number of new research projects in the province addressing the various aspects of climate change as it relates to agriculture are under development. Manitoba Agriculture and Food provides a grant that supports research at the University of Manitoba. The Agriculture and Research Development Initiative is also available to encourage innovation in research.

Manitoba Hydro

Hydrogen Opportunities	Formation of an internal Manitoba Hydro task force to study hydrogen opportunities (e.g. hydrogen production methods, markets). Members of this task force will be participating in the Manitoba Hydrogen Steering Committee working groups.
Wind Monitoring	Manitoba Hydro, Manitoba Conservation and the Energy Development Initiative are jointly funding a $150,000 wind monitoring program for 2002/2003. Approximately four sites will be selected and monitored for one year.
Micro Hydro	The Manitoba government, through Manitoba Hydro, is participating in a $1.7 million project to study the economics of building and operating micro hydro turbines in all four of Manitoba's diesel-electric powered (off-grid) communities. The Keewatin Tribal Council is a lead partner in this project. INAC is also a partner.

Manitoba Industry, Trade & Mines

East-west Electric Transmission Grid Study	Co-ordinated by the Manitoba Energy Development Initiative, Manitoba Hydro and Manitoba Conservation, a pre-feasibility study to examine the practicality and economic benefit of constructing high voltage transmission capability linking Canadian markets (within the context of the developing North American electrical transmission system) was completed. The federal government, provinces and territories provided funding. Bringing renewable hydro-electricity to electricity markets served by thermal generation would reduce greenhouse gas emissions.
Hydrogen Development	Co-ordinated by the Manitoba Energy Development Initiative, a provincial hydrogen steering committee has been established to assess hydrogen economic development opportunities for Manitoba. Participation includes three levels of government, Manitoba Hydro, AECL, industry and the academic community. A series of working groups are currently assessing opportunities in the following areas: hydrogen production and fuel movement, research/scientific centre of excellence, transportation and refuelling infrastructure, hydrogen used in existing processes, stationary and portable fuel cell applications, and spin-off business opportunities.

Manitoba Transportation & Government Services

Canadian Transportation Fuel Cell Alliance (CTFCA)	Partnering in the development of fuel cell technology through the Canadian Transportation Fuel Cell Alliance. Hosted Canadian Transportation Fuel Cell Alliance Workshop in Winnipeg, September 2001. Advancing opportunities through demonstration project funding for hydrogen transportation fuel infrastructure for heavy and light duty vehicles.
Urban Transportation Showcase Program	Represents the province, in partnership with Manitoba Intergovernmental Affairs and the City of Winnipeg, in the federal program to demonstrate innovative ways to reduce greenhouse gases from urban transportation activities. Phase 1, expression of interest, is completed. Phase 2 is under development. For example, demonstrations could include hybrid-electric or hydrogen powered fuel cell transit buses.

Enhancing Awareness and Understanding

While most people will recognize climate change as a problem, many don't understand that solutions may require significant changes to our lifestyles. Developing an effective response to climate change requires everyone to make changes and become acquainted with the potential effects expected in Manitoba.

Bringing about a wider understanding of climate change, and the solutions that will help us now and in the future, requires a variety of approaches. For example, the Manitoba curriculum for high school science now includes climate change. This brings knowledge about the potential effects of climate change into classrooms across the province. For a broader audience, the Manitoba Climate Change Connection has been established to promote public education and outreach. This organization will distribute information on climate change mitigation and adaptation and provide a place for citizens and local groups to find information that addresses their specific needs.

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Manitoba Agriculture & Food

Workshops on Landscape Sequestration of Greenhouse Gases	Awareness workshops were held in 2000. Representatives of industry, research, government and farm communities were among the presenters that highlighted sequestration and trade mechanisms. These workshops were the result of recommendations arising from stakeholder meetings.
Climate Change Adaptation Public Information and Outreach	Providing climate change adaptation related information briefings and workshops including awareness presentations at agricultural technical meetings throughout the province.
Climate Leadership in Manitoba Agriculture (CLIMA)	Climate Leadership in Manitoba Agriculture (CLIMA) is a departmental team set up to build on the knowledge of climate change and create awareness in the agricultural sector. The committee includes expertise in soils, conservation, livestock, agro-meteorology, policy and crop insurance. Its work includes responding to the direction and recommendations of the Manitoba Climate Change Task Force. CLIMA is also developing an action plan for agriculture.
Taking Charge Project	Partnering with the Taking Charge project on climate change awareness with the Manitoba chapter of Soil Conservation Canada and the Manitoba Zero Till Association.

Manitoba Conservation

Manitoba Climate Change Task Force	The premier appointed this Task Force which was chaired by the Hon. Lloyd Axworthy. Consultations were conducted through a series of public meetings. Oral submissions as well as electronic and written submissions were accepted. The final report was delivered to the Manitoba Government in September of 2001. An interdepartmental committee provided support to the Task Force.
Manitoba Climate Change Action Fund (listed under all categories)	The Manitoba Climate Change Action Fund (MCCAF), a component of the Sustainable Development Innovations Fund (SDIF), is allocated $250,000 annually to support projects focusing on public education and outreach; the scientific understanding of climate change effects and potential adaptation practices; technological innovation (research and commercialization); and energy-efficiency and alternative or green energy. Priorities for funding areas will be reviewed annually.
Climate Change Public Education and Outreach Hub (Climate Change Connection)	Public information hub established at Manitoba Eco-Network with sectors including industry, agriculture, universities, health, students, Aboriginal organizations, business and environmental groups.

Manitoba Education, Training & Youth

Climate Change Learning Resource for Senior 2 Science	Proposal submitted to Manitoba's Sustainable Development Innovations Fund (SDIF) to purchase copies of "Inuit Perspectives On Climate Change" for all schools with Senior 2, and develop a teacher's guide to support implementation of the new curriculum. SDIF approved the funding September 27, 2001.
Integration of Climate Change into Manitoba Curriculum in Science	Curriculum development process that includes integrating sustainable development into its curricula wherever appropriate. Climate change is a topic that has been integrated into the Manitoba science curricula in Grade 5 and Senior 2 as part of that process.

Manitoba Hydro

Fort Whyte Centre Financial Support	Financial support is provided for the Centre's energy and climate change education program that includes the recently established field station.

Manitoba Transportation & Government Services

Climate Change Workshop and Outreach	Sponsored transportation and climate change workshop with transportation service providers and users.
Public and Industry Outreach on Climate Change and Transportation	Delivery of climate change/transportation presentations to conferences, stakeholders and industry associations, universities graduate seminars, departmental and interest group/service club meetings.
Northern Transportation Infrastructure Climate Impacts and Adaptation	Northern infrastructure climate effects and adaptation information exchange network will be established. A public information session on effects and adaptation in northern transportation infrastructure, including winter roads will be held.

Encouraging Action in All Sectors

There is little doubt that over time we will learn more about climate change, its causes and its effects. New technologies and skills will be developed to reduce emissions and assist us in adapting to climate change. Individuals and businesses in Manitoba will develop many of these technologies and skills, often with direct economic benefits for Manitoba; however, new innovations and skills can take considerable time to become widely adopted. Many climate change solutions are available now or will be in the near future. For these

Ethanol blend gasoline
Courtesy of Husky Energy

solutions to have a greater impact on Manitoba's emissions and its adaptive responses, a variety of actions can be employed to encourage people in all sectors of our economy and province to take action. Some of these provide increased information to the public, helping them purchase goods and services that reduce greenhouse gas emissions. Others involve tax reductions that encourage the adoption of new lower-emitting technologies by reducing the costs to consumers. An example of this is Manitoba's Ethanol Blended Tax Relief Program, which offers a 10-year incentive for Manitoba-made ethanol blended gasoline. Another example is the Geothermal Heat Pump Program introduced by Manitoba Hydro.

Manitoba Agriculture & Food

Covering New Ground	This program disseminates information on sustainable agricultural ecosystems with a best management practices component including mitigation and adaptation by agricultural producers and commodity organizations. In partnership with more than 70 local delivery groups including commodity organizations and producers groups.
Agro-meteorological Centre of Excellence and Weather Station Network	Provides detailed real-time weather information to producers across the province. This information is used by producers to make better informed management decisions on disease, insect, irrigation and frost prediction.
Manitoba Livestock Manure Management Initiative	Initiative addresses best management practices and will accept projects that address climate change.
Destination 2010	Outlines direction for the Manitoba Agriculture and Food strategic plan of action for the next decade that was developed with agriculture sector partners. The plan pledges to assist the agricultural community in adapting to climate change, participate in activities that reduce greenhouse gas emissions and foster the adoption of proven and new farm technologies and crops in addressing climate change.
Sequestration/ Emission Trading Opportunities Strategy	Develop a Manitoba strategy for greenhouse gas carbon sequestration and emission trading in partnership with the agricultural sector. Raise awareness and knowledge, examine and develop options and policy for on-farm and agri-industry opportunities in future sequestration and emission trading scenarios. Explore opportunities for agricultural and biological-based products to mitigate and sequester greenhouse gases.
National Agriculture Policy Framework	Climate change has been identified as a top national priority for action across Canada in the forthcoming strategic action plan, "Agriculture Policy Framework."

Manitoba Conservation

Ozone Depleting Substances Industry and Public Consultations	Manitoba Conservation, in partnership with the Manitoba Ozone Protection Industry Association (MOPIA), consulted Manitoba industry stakeholders to provide comments on the proposed recommendations of a national action plan to accelerate the phase-out of chlorofluorocarbons (CFCs) and halogenated fluorocarbons (HFCs) and the establishment of stewardship responsibilities for the management of ozone depleting substances under a regulatory framework.
Waste Reduction and Pollution Prevention (WRAPP) Fund	The Waste Reduction and Pollution Prevention (WRAPP) Fund, a component of the Sustainable Development Innovations Fund (SDIF), has $550,000 annually to support projects focusing on waste reduction, pollution prevention and innovative integrated waste management practices. Priorities for funding will be reviewed on an annual basis. Initiatives to reduce the amount of solid waste reaching landfills and encouraging composting of organic waste contribute to reducing greenhouse gas emissions.
Manitoba Climate Change Action Fund (listed under all categories)	The Manitoba Climate Change Action Fund (MCCAF), a component of the Sustainable Development Innovations Fund (SDIF), has $250,000 annually to support projects focusing on public education and outreach; the scientific understanding of climate change effects and potential adaptation practices; technological innovation (research and commercialization); and energy-efficiency and alternative or green energy. Priorities for funding areas will be reviewed annually.

Manitoba Finance

Ethanol Blended Tax Relief Program	A tax reduction of 2.5 cents per litre is allowed for blends of 10 per cent alcohol in gasoline sold in the Province of Manitoba. The alcohol must be derived from biomass materials, denatured and contain not more than one per cent water. The tax relief applies only to the gasoline containing alcohol that is produced and consumed in Manitoba.
Ecologically Sensitive Land Tax Credit	Offset to property taxes paid, calculated in dollars per acre affected, for specified riparian management measures on private agricultural land. Provide incentive and recognition to landowners taking action to protect riparian areas and improve water quality. Improved riparian integrity reduces the amplitude of the flood/drought cycle. Marginally reduced greenhouse gas emissions due to improved riparian integrity/cover; a small carbon sequestration effect as less land is disturbed through cultivation or clearing.

Manitoba Hydro

Power Smart Programs

Manitoba Hydro has delivered the highly successful Power Smart program for over 10 years. During this period a number of initiatives have been launched following the Power Smart objective of accelerating the acceptance of energy-efficient products and services. As energy-efficient technologies achieve market transformation the program exit strategy is implemented and new programs are introduced.

One such program, the Power Smart Home Comfort Loan program, initiated in 2001, has resulted in $17 million dollars worth of loans with over 5,000 Manitobans receiving audits and information with an estimated annual energy saving worth $750,000 dollars.

Power Smart, demand side management programs, that are currently available to residential, commercial and industrial customers include:

Residential Programs	Commercial programs	Industrial Programs
Appliance program	Commercial lighting	Industrial optimization
Power Saver cord	Commercial custom	High efficiency motors
Class A energy audits	Air barrier systems	Curtailable rates
Class B energy audits	Commercial windows	Eco-efficiency program
Seniors energy audit program	Air-conditioners	Enertrend
Home Comfort Loan program	Parking lot controllers	
Power Smart R-2000 program	Internal retrofit	
Home energy workshops (new & existing homes)	Agricultural heat pads	
Gas finance plan	Heat pumps	
Residential earth power loan	Power Smart Energy Manager pilot program	
	Convenient financing	
	Enertrend (customer billing information)	

Courtesy of Manitoba Hydro

Manitoba Hydro Power Smart Eco-Efficiency Solutions (also listed under Power Smart Programs)

Pilot program is to complete detailed eco-efficiency assessments at 15–20 Manitoba industrial facilities, drawn from at least three different industry sectors, by March 31, 2003. These detailed assessments will identify process improvement opportunities that will result in reductions in energy and water use and the reduction of wastewater, solid waste, greenhouse gas and other air emissions.

Geothermal Heat Pump Initiative (also listed under Power Smart Programs)

A program was announced on April 4, 2002, by Manitoba Hydro to promote the installation of geothermal heat pumps. The program includes the residential Earth Power Loan, a program that provides capital financing (up to $15,000 and convenient pay back arrangements on electricity bills). For commercial customers a rebate and feasibility study assistance are available.

Manitoba Industry, Trade & Mines

Establishment of Manitoba Energy Development Initiative	The initiative was created within Manitoba Industry, Trade and Mines to develop, implement and co-ordinate government-wide economic development strategies encompassing the province's hydro-electric and alternative energy development opportunities; develop, analyze and implement the provincial government's energy policies; monitor the implementation of energy-related climate change initiatives, including those energy-related recommendations contained in the Climate Change Task Force Report, and facilitate regular reporting to the government's Executive Council on the progress of climate change and energy development initiatives.
Ethanol Mandate	Public consultations to move towards a mandate of 10 per cent ethanol in all gasoline sold to further promote use and production of ethanol, which will reduce greenhouse gas emissions in the transportation sector, while further strengthening and diversifying Manitoba's agricultural economy.
Amendment of Drilling and Production Regulation under *The Oil and Gas Act*	Regulatory amendment requiring that emissions from all oil and gas facilities comply with Manitoba air quality objectives. Will require flaring or sweetening of gas at some facilities where raw gas is currently vented.
Provincial Energy Policy	The Manitoba Energy Development Initiative, in collaboration with stakeholders and with public consultation, will develop a broad provincial energy policy that will create a framework for sustainable economic development and programs which will contribute to the reduction of greenhouse gases.
Provincial Emerging Renewables/ Alternative Energy Policy	Co-ordinated by the Manitoba Energy Development Initiative, a provincial inter-departmental working group will be established to develop policy and communication options that will encourage the development of various emerging renewable and alternative energy sources.

Manitoba Intergovernmental Affairs

Expansion of Winnipeg's Recycling Program to Apartments and Condominiums	$685,000 has been provided to support the expansion of Winnipeg's recycling program to apartments and condominiums. This targeted funding assisted the City of Winnipeg in responding to one of its most pressing service concerns consistent with the province's environmental program. Reducing the organic solid waste that enters landfills will reduce greenhouse gas emissions from those landfills.

Manitoba Transportation & Government Services

North America's Superhighway Coalition (NASCO) Alternative Fuel Subcommittee	Advancing alternative fuel infrastructure along Highways 75 and U.S. Interstate 29 between Winnipeg, Manitoba, and the central United States. Established Terms of Reference and proposed committee structure.

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