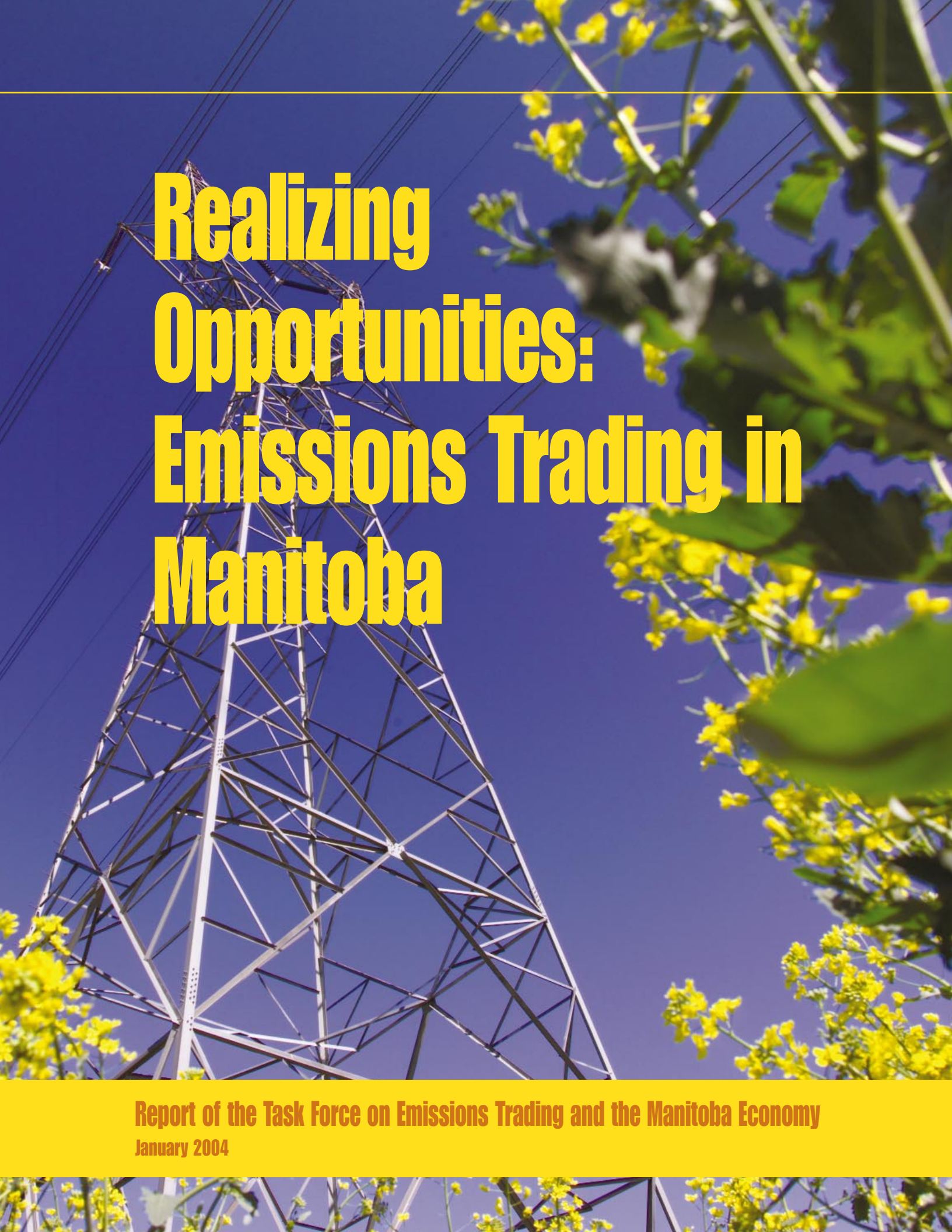

Realizing Opportunities: Emissions Trading in Manitoba

Report of the Task Force on Emissions Trading and the Manitoba Economy

January 2004

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The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and indicators, and natural resources management. By using Internet communications, we report on international negotiations and broker knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

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The International Institute for Sustainable Development acted as secretariat to the task force. Stephan Barg was secretary to the task force and managed the project for IISD. Warren Bell, John Drexhage, Peter Hughes, Darren Swanson and Henry Venema advised on many issues, conducted research and drafted the report. Stuart Slayen edited the report, Lael Dyck served as a proofreader and Donald Berg designed the report.

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Chairman's Letter and Members' Endorsement

January 1, 2004

The Honourable Gary Doer
Premier of Manitoba
Legislative Building
Winnipeg, Manitoba

Dear Premier Doer:

In June 2003 you invited me to chair a task force to analyze the implications for Manitoba of Canada's proposed domestic greenhouse gas emissions trading system and to make recommendations regarding economic and environmental opportunities for Manitoba. The attached report details the task force's 17 recommendations and gives an overview of the proposed trading system for Canada, an analysis of who will be affected in Manitoba and an examination of the possible sources of offsets in Manitoba. There is also a glossary of the complex terminology of emissions trading.

To help meet Canada's commitment under the Kyoto Protocol, the federal government has proposed a domestic emissions trading system that will run from 2008 to 2012. This system is currently in the design stages and is still malleable as the federal government is actively seeking feedback on various components of the system. Therefore, many of the recommendations in the report relate to aspects of the system that the task force feels should be promoted by Manitoba. Other recommendations relate to actions that Manitoba itself can take.

While international implementation of the Kyoto Protocol is now dependent upon Russian ratification, the planned early start to emissions trading in the European Union and the voluntary trading that is now occurring in the Chicago Climate Exchange point to a virtual certainty that a dynamic trading market for emissions will emerge in some form—with or without Kyoto—in the near future.

My colleagues on the task force—Rob Altemeyer, Bob Brennan, Andrew Cowan, Terry Duguid, Kerry Hawkins, Merrell-Ann Phare, Bob Puchniak, David Runnalls, Marsha Sheppard, Michael Spence and Ian Wishart—prepared this final report with the International Institute for Sustainable Development serving as secretariat. Our task force convened three meetings during which we heard from federal government officials, emissions trading experts from around the world and representatives from specific sectors.

The task force came to three overarching conclusions, which form the basis of our 17 recommendations to your government. These conclusions are:

1. *Manitoba has a natural advantage in offsets and clean electricity.* Manitoba's natural advantage in domestic emissions trading is on the supply side and occurs in primarily two areas: the supply of offset credits via emission reductions and removals, and the provision of clean renewable electricity.

2. *2008 is too late!* The planned start date of 2008 for the domestic emissions trading system is risky. The environmental and economic stakes are simply too high to wait until 2008 to find out if the system will work efficiently and to provide the necessary incentives for emission reductions and removals.
3. *We need to get the trading system right in the long run*. The currently proposed system needs major revisions in order to foster a clean-energy, low-emission economy.

Of the task force's 17 recommendations, the central ones are:

The new system must provide stronger incentives for non-emitting electricity and energy efficiency. The goal here is threefold: (1) to ensure that new electricity supplies minimize greenhouse gas emissions; (2) to provide an incentive for the development and implementation of efficient technologies; and (3) to maximize the value of Manitoba's existing non-emitting electricity sources. If the incentives are too small, there will be little action by emitters or by those who can create offsets, and thus no real change in emission patterns. The currently proposed federal plan—*The Climate Change Plan for Canada*—provides low or inconsistent incentives to generate electricity more efficiently or from non-emitting sources. For example, a new low-impact hydro development in Manitoba would receive no incentive. Without reasonable and consistent incentives, Canada's energy mix will not change. [See Recommendation #1, page 7 for details.]

Expand the coverage of the emissions trading system. The currently proposed system includes only large industrial greenhouse gas emitters. A broader trading system would provide economic incentives to more emitters across the economy. This will have two impacts: (1) there will be a greater reduction of emissions because of wider coverage of the system of incentives; and (2) the total cost of the reductions should be less, because the larger pool should provide some cheaper options. [See Recommendation #16, page 19 for details.]

Promote a clean electricity network. A strengthened transmission system is necessary in order to allow new hydro and other emerging non-emitting electricity sources to serve users. This will allow, for example, new hydro sites to be developed in Manitoba that will provide replacement energy for coal-fired power plants that are expected to close in Ontario. It would also allow new wind and other emerging electricity sources—solar, for instance—that are not close to transmission systems to be utilized. [See recommendation #5, page 11 for details.]

Start the Canadian emissions trading system before 2008. The task force believes that waiting until 2008, when our Kyoto commitment period starts, is both risky and inefficient. It is risky because the system will be complex, and will need a period of trial and adjustment to ensure it is meeting its goals. We cannot afford to experiment when we are into the commitment period. Waiting is inefficient because it means that we will have to reduce our emissions much faster than we would if we were to start earlier, in order to meet our target. An earlier start means a more gradual reduction.The Europeans have recognized both of these arguments by scheduling their system to start in 2005, with reduced targets and penalties for non-compliance. Canada should do the same by setting targets for 2006–2007. [See Recommendation #11, page 15 for details.]

Seek to integrate the Canadian system with emerging trading systems in the U.S. Canada needs to continue to try to integrate its emission reductions with those of our major trading partner. This is made difficult by the lack of a national system in the U.S., and its rejection of the Kyoto Protocol. However, emissions reduction and trading systems are developing through state government action and co-operation in the Northeast and the Northwest. In addition, the Chicago Climate Exchange offers a voluntary approach to the same issues. As we design our emissions trading system, we need to keep the doors open to integration across the U.S.-Canadian border. This will also help reduce any impact on competitiveness that arises because Canada has made a commitment not mirrored at the national level in the U.S. [See Recommendation #15, page 18 for details.]

On behalf of my task force colleagues, I thank you for your keen interest and support for our efforts. Climate change is real, and a real concern to Manitobans. Our 17 recommendations are designed to help Manitoba realize economic and environmental opportunities within the federal government's proposed trading system and provide a roadmap for Manitoba to become an innovative leader in the GHG emissions trading market in Canada and internationally.

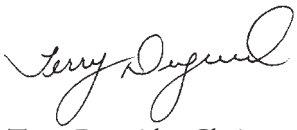
Lloyd Axworthy
Chair, Task Force on Emissions Trading and the Manitoba Economy

Task Force Members

Rob Altemeyer – MLA for Wolseley

Bob Brennan – President and Chief Executive Officer, Manitoba Hydro

Andrew Cowan – Environmental Coordinator, City of Winnipeg



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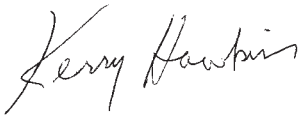

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David Runnalls – President and Chief Executive Officer, International Institute for Sustainable Development

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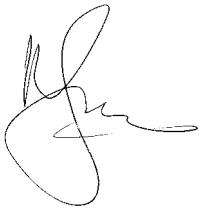
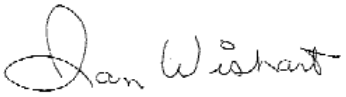


Michael Spence – Mayor, City of Churchill



Ian Wishart – Executive Member, Keystone Agricultural Producers

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The Task Force on Emissions Trading and the Manitoba Economy

Canada's response to climate change is one of the most important public policy choices facing the country. Manitoba played a leading role in helping to define that response during the debates over ratification of the Kyoto Protocol. It is time now to address issues of implementation, one of the most important being the matter of emissions trading and the supply of offset credits to this system by those who sequester carbon and reduce emissions. It is for this reason that the Government of Manitoba established this Task Force on Emissions Trading and the Manitoba Economy.

The Task Force on Emissions Trading and the Manitoba Economy was asked in June 2003 to analyze the implications for Manitoba of Canada's proposed domestic emissions trading system, and to make recommendations regarding economic and environmental opportunities for Manitoba. The task force was chaired by the Honourable Lloyd Axworthy. The task force's 12 members and five observers represented a cross section of affected sectors in Manitoba.

In its deliberations, the Task Force on Emissions Trading and the Manitoba Economy arrived at three overarching conclusions:

1. *Manitoba has a natural advantage in offsets and clean electricity*. Manitoba's natural advantage in domestic emissions trading is on the supply side and occurs in primarily two areas: the supply of offset credits via emission reductions and removals, and the provision of clean renewable electricity.
2. *2008 is too late!* The planned start date of 2008 for the domestic emissions trading system is risky. The environmental and economic stakes are simply too high to wait until 2008 to find out if the system will work efficiently and to provide the necessary incentives for emission reductions and removals.
3. *We need to get the trading system right in the long run*. The currently proposed system needs major revisions in order to foster a clean-energy, low-emission economy.

The task force made a total of 17 recommendations to the Government of Manitoba based on the above conclusions. Some of the recommendations are meant to be passed on to the federal government by the provincial government, while others are for the Manitoba government itself to consider. This report also provides summary information on Canada's proposed domestic emissions trading system; a description of who is affected in Manitoba; a description of opportunities for emissions reduction and removal, and offsets in Manitoba; and a summary of the administrative requirements of the proposed domestic emissions trading system and the opportunities these might present to Manitobans.

Manitoba has the major advantage of a very low-emission economy compared to the rest of Canada. It can also make further significant contributions to reduced emissions in Canada, if the national system is designed appropriately. The results can be good for climate change policy in Canada, as efficient and economical ways to reduce emissions in Manitoba can be made available to meet national goals. The results can also be good for Manitoba, because the province can make use of its natural advantages and develop new activities that will simultaneously diversify the economy and contribute to environmental integrity.

While this report was commissioned by the Manitoba government, we also intend it to help businesses, agricultural producers and others to understand the often obscure issues that emissions trading policy raises. In so doing, we hope to contribute to positive policy development and to the more effective use of these policies as they are implemented.

Box 1. Setting the stage for this task force.

In 2001, Manitoba's Climate Change Task Force recognized that Manitoba is well placed to benefit from an effective emissions trading system, by nature of its potential to expand its clean and renewable energy supply, as well as the potential in its forest and agricultural sinks. To capitalize on opportunities in emissions trading and sinks, the 2001 task force recommended that the Manitoba government:

- work with the federal government to immediately establish and fund a voluntary national emissions trading regime;
- urge the government of Canada to establish international and North American emissions trading regimes that are both environmentally credible and economically efficient;
- assist Manitoba's private businesses and Crown corporations to become involved with voluntary and demonstration emissions trading initiatives in Manitoba, Canada and North America;
- establish a carbon trading and/or auctioning centre in Manitoba, or utilize a current commodity trading institution able to support emissions trading activities; and
- address the knowledge gaps related to determining Manitoba's potential for our forestry and agriculture sectors to participate in sinks and emissions trading opportunities.

These recommendations and others were analyzed and considered in detail by the 2003 Task Force on Emissions Trading and the Manitoba Economy.

The 2001 task force report, entitled *Manitoba and Climate Change: Investing in our future*, is available online at http://www.iisd.org/taskforce/pdf/final_report.pdf

Climate Change, the Kyoto Protocol and the Role of Emissions Trading

The climate change risk is real, and a real concern to Manitobans. Northern communities, in particular, are already experiencing the impacts of climate change.

In the high Arctic the early warning signs are apparent. The multi-year sea-ice is smaller and now drifts far from shore in the summer, taking with it the seals upon which communities rely for food. In the winter the sea-ice is thin and broken, making travel dangerous for even the most experienced hunters. Warmer than normal weather in the summer is melting the permafrost and causing large-scale slumping on the coastline and along the shores of inland lakes. The impacts are evident even farther north. Around the town of Sachs Harbour, Northwest Territories, the melting is causing building foundations to shift and the melting has already caused one inland lake to drain into the ocean, killing the freshwater fish.[1]

In northern Manitoba, the people of Churchill are noticing changes in animal migration patterns with "polar bears arriving earlier, leaving later."[2] Studies in Churchill have shown that "for every week earlier that break-up occurs, bears come ashore 10 kg lighter," and although the polar bear population is currently stable, there is strong evidence that reproductive health is deteriorating.[3]

Observations in the North make sense in light of current global climate model projections which show that "northern regions will experience some of the most immediate and dramatic effects of a warming climate."[4] For central regions of Manitoba, it is projected that by the latter part of the century, Manitoba will receive nine per cent more precipitation and will be an average of five degrees Celsius warmer. The increased temperature is projected to result in higher rates of evaporation—an average increase of over five cm/year—and, consequently, soil moisture levels are projected to decrease.[5]

Box 2. Global climate models.

Global climate models are similar to the tools that inform our local weather forecasts. The difference is that global climate models cover a much larger area—the entire planet.

The most sophisticated global climate models are called Atmosphere-Ocean General Circulation Models, or AOGCMs. These models couple mathematical descriptions of the physical processes of atmospheric circulation, large-scale ocean circulation, thermodynamics of sea and ice interactions, the hydrologic cycle of land surfaces, and estimates of future greenhouse gas emissions to project how the global climate will change in the future.

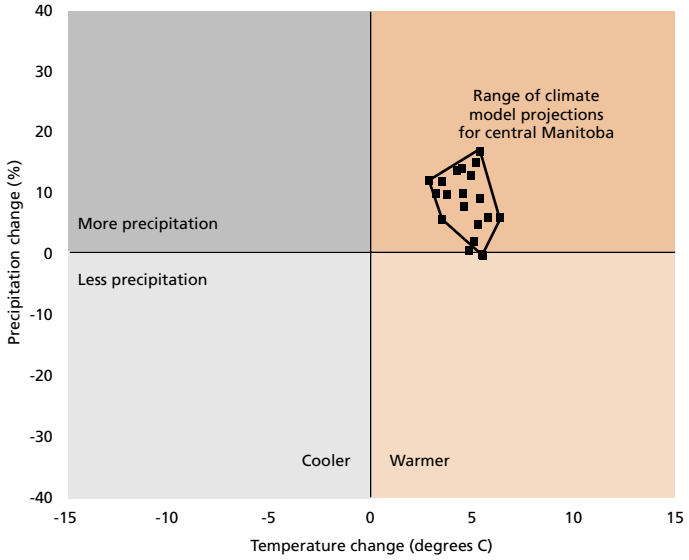
There are currently more than 20 such models in use around the world.

Virtually every aspect of Manitoba's environment is vulnerable to climate change—forests, lakes, our northern coastal shore and wildlife habitats, just to name a few. It is hard to think of aspects of our economy and society that are not in some way linked to the land and, therefore, vulnerable to climate change. It is for this reason that Manitoba supports Canada's efforts to assist the global community in reducing emissions of greenhouse gases through the mechanisms of the Kyoto Protocol.

Unfortunately, even if we could stabilize global emissions today, temperatures would continue to rise due to momentum in our global climate system.[6] Therefore, in addition to reducing our emissions of greenhouse gases, we must be prepared to adapt to our changing climate—we must understand our vulnerabilities and become resilient to a range of potential climate futures.

Figure 1. Global climate model projections for precipitation and temperature (central Manitoba in the 2080s, relative to a 1961–1990 baseline).

Projections summarized from the Canadian Climate Impacts Scenarios (CCIS) project Internet site for the period represented by the 2080s, IS92a scenario—"business-as-usual." The CCIS project is funded by the government of Canada's Climate Change Action Fund with the objective to "provide climate scenario information and scenario construction advice to impacts researchers in Canada." University of Victoria, Victoria, B.C., Canada, http://www.cics.uvic.ca/scenarios/



These projections and vulnerabilities play out to greater and lesser degrees in all parts of the world—this is the context of the Kyoto Protocol, the international agreement which sets binding carbon emission levels for industrialized countries and countries in transition. As part of the Kyoto agreement, Canada has agreed to reduce its emissions by six per cent from 1990 levels for the 2008–2012 period. While this is an important step that will lead to a significant reduction in Canada's emissions, it is only one step on the way to addressing the climate change situation. Canada and other countries will need to move along a new, low-carbon development path in order to meet the climate change challenge. Manitoba can help achieve this.

The plan to meet the Kyoto commitment was tabled by the federal government in its *Climate Change Plan for Canada* in the fall of 2002, calling for action in five sectors: transportation; housing and commercial/institutional buildings; industry; small and medium-sized enterprises; and the international market.

Directed at these areas is a mix of policy instruments to help meet Canada's commitment including innovation and technology investments; infrastructure investments; a partnership fund; targeted measures; and, for industry, a system limiting emissions and providing for emissions trading. It is the emissions trading system and its supporting policies that are the focus of this task force report.

Description of Emissions Trading

The Kyoto Protocol is an international agreement which sets binding emission levels for industrialized countries and countries in transition. Under the Kyoto Protocol, Canada is committed to reduce greenhouse gas emissions to six per cent below the country's 1990 emissions.[7]

Emissions trading uses the market to achieve an environmental target efficiently. By doing so, it places a monetary value on emissions and, by promoting flexibility, it provides a cost effective means to achieve environmental targets.

In the context of climate change and the Kyoto Protocol there will be two kinds of emissions trading systems established:

- International emissions trading (IET) – established under the Kyoto Protocol; and
- Domestic emissions trading (DET) – to be established in Canada and in other countries, each with its own set of rules.

Emissions trading—international and domestic—has two critical components: it sets a price on greenhouse gas emissions, and it provides a more cost-effective means to reduce GHG emissions than traditional approaches based on regulation and taxation. It has been used successfully to regulate SO_2 emissions in the United States. The United Kingdom has piloted emissions trading for GHG emissions and it is now being used to regulate GHG emissions in the United States on a voluntary basis via the Chicago Climate Exchange (CCX), and in individual private corporations including Shell and BP.

Emissions trading enables a greenhouse gas emitter to buy or sell emission permits, depending on whether that emitter is over or under its permitted level. While there are many complexities involved, the principle is straightforward: if an emitter is expecting to exceed its allowed level of emissions, it can either spend money to reduce its emissions or else purchase extra emission permits from someone else. If the market price of a permit is higher than our emitter's internal cost, the emitter will reduce its emissions internally. If the price is lower, it will buy the permits from others.

On the supply side of the trade, if an emitter can reduce its emissions for a cost lower than the market price of the permits, it will make that reduction, sell the permits and make a profit on the transaction.

A domestic emissions trading system is currently being proposed by the Government of Canada. Of the current projected 240 Mt reduction in emissions required in 2008–2012, the government expects 55 Mt to be delivered by "large final emitters" (LFEs)—namely the 650 to 700 firms operating in the thermal electricity, oil and gas, mining, and manufacturing sectors. Each emitter will have a cap, limiting its emissions to a stated level. Trading will be allowed to meet the cap. The cap will be set through a system that would give LFEs the opportunity to enter into an agreement with government to reduce their emissions (called a *covenant*), or else be governed by what is called a *regulatory backstop* which provides a default target and covers such issues as compliance, reporting and verification.

To help LFEs meet their emissions reduction targets, LFEs (in addition to being able to trade among themselves), will have the option of purchasing offset credits. Offset credits can be generated from two types of activity: (1) *carbon sequestration* activities (also referred to as sinks or emission removals) such as tree-planting and zero-till cropland management which capture and store carbon; and (2) *emission reductions* from activities not regulated under the backstop/covenant system, such as landfill gas capture, manure management and transportation fleet management. The main criteria for qualifying as an offset are that (i) activities should not already be covered by the covenant/backstop system; and that (ii) the emission reductions should be surplus to those that would be achieved by existing regulations or climate change policies. A more detailed discussion of Canada's proposed emissions trading system can be found in the section beginning on page 59.

Task Force Recommendations

Manitoba has a natural advantage in offsets and clean electricity

Manitoba produces less than one per cent of Canada's industry-related greenhouse gas emissions. Given our low-emission economy, it is not surprising that there are relatively few LFEs in Manitoba. The national emission targets will have modest direct consequences for Manitoba firms and Manitobans generally.

Manitoba's natural advantage in domestic emissions trading is on the supply side and occurs in primarily two areas: the provision of clean renewable electricity; and the supply of offset credits via emissions reductions and removals. Four areas appear particularly promising for generating offset credits: livestock and manure management; cropland and grazing land management; afforestation and reforestation; and landfill gas capture.

The disparity between business activity in the province and the volume of industrial greenhouse gas emissions is explained, in part, by the extensive use of hydro-electric power to generate electricity—97 per cent of electricity supplied in the province. However, under the current proposed domestic emissions trading system, emission reductions that result from increased non-emitting electricity supply or energy efficiency receive a significantly smaller incentive compared to reductions from improved thermal efficiency. The task force makes several recommendations for the province to influence the design of the emissions trading system to provide better incentive for clean energy in both the short and long term.

Table 1. Manitoba's low-emission economy.

Province/ Territory	Industrial GHG emissions (kilotonnes CO_2 equivalent), 1995	% of national total
Ontario	56,190	44.2
Quebec	27,342	21.5
Alberta	22,335	17.6
BC & Territories	9,801	7.7
Atlantic Provinces	7,307	5.8
Saskatchewan	3,023	2.4
Manitoba	**1,055**	**0.8**
CANADA	127,053	100

Sources: Statistics Canada and Natural Resources Canada, Canada's Emissions Outlook.

Recommendation #1:

Provide incentives for non-emitting electricity and energy efficiency.

Recommend to the federal government that emission reductions from new low-impact, non-emitting electricity and energy efficiency be included in the backstop/ covenant system or be eligible to create offset credits.

New electricity supplies from low-impact, non-emitting sources and energy efficiency offer significant emissions reduction opportunities for Canada. However, the proposed design of the emissions trading system provides very limited incentives for either new non-emitting electricity supply or for energy efficiency.

The backstop/covenant system for LFEs is expected to set targets for emissions from thermal generation of electricity. These targets will be on an intensity basis, and generators will be provided with allowances equal to their current production of thermal electricity multiplied by an emission factor. Under the currently proposed system, electricity from new non-emitting sources and reductions due to improved energy efficiency or demand side management, are not eligible to receive allowances and not eligible to create offset credits.

While the purpose of an emissions trading system is to create a financial incentive to reduce emissions, this allocation method significantly reduces the effective carbon price benefit from investments in new non-emitting electricity sources or energy efficiency.

Incentives for emission reductions from new non-emitting electricity and energy efficiency should be included either in the offset system or in the LFE system. There are challenges associated with including these resources in the offset or LFE systems, but they are the same challenges that are presented by other types of reduction/removal projects, and are not a basis for exclusion from the system. Questions of the overlap with other climate change policies and whether they are business-as-usual (BAU – actions that would have been taken for reasons other than to address climate change) must be addressed for all projects. While there are quantification challenges associated with establishing an emission factor for new non-emitting electricity and energy efficiency, these have been addressed in other jurisdictions. The most straightforward approach may be to use the emission factor assigned to thermal generation.

For supporting information on Recommendation #1, see page 21.

Recommendation #2:

Establish a national offset office in Manitoba.

Recommend to the federal government the establishment of an offsets centre in Manitoba. The centre could carry out the following:

- Technical support and outreach to project proponents, including the development and dissemination of standard methods (or protocols) for quantifying reductions and removals. These functions are needed to minimize project development and transaction costs, especially in the farm sector. While the federal government is expected to provide some of these services, there is likely a need for an "on-the-ground" presence in Western Canada to provide direct support to proponents.
- Validation of offset projects – as the national validation office or as a regional or sectoral authority responsible for reviewing reduction/removal projects and determining their eligibility for the offset system.
- Research and technical support for offsets.

With over half of Manitoba consisting of forest and agricultural land, Manitoba is an excellent choice for housing many of the administrative and technical research components necessary for the development and delivery of the proposed offset system in Canada. Broad participation in the offsets market will require that technical support and other resources be made available to proponents. It will also require the establishment of new institutions to review and approve offset projects and the associated reduction/removals.

Some of these functions can be carried out by the private sector, while others are likely best suited to government or independent government-funded agencies. An offsets office funded primarily by the federal government could be established in Manitoba to carry out some of these functions, including project validation and/or technical support for proponents.

The proposed national offset system potentially presents substantial barriers to participation by project developers, especially in the farm sector. The system is likely to be seen as complex, unfamiliar and risky. Unless the costs and risks of participation can be substantially reduced, the offset system will likely not be successful in generating a significant number of new projects. A Manitoba offset office could help increase participation and reduce transactions costs by:

- developing and disseminating standardized quantification methods and protocols;

- engaging in outreach activities to explain the offset system and process throughout Western Canada; and/or
- providing technical support and assistance to project proponents through the development and validation phase of projects.

Additionally, there may be a need for a specialized centre of expertise for agriculture or other sources of offsets. The Local Government District of Pinawa has proposed that a Provincial GHG Data Management and Research Facility be established in Pinawa, drawing on local facilities and expertise. The current proposal focuses on research and technical support for:

- geological sequestration in Canada and globally, particularly research into tools to understand risk assessment;
- verification and validation of programs based on current Environmental Verification Entity status and assistance to the Ottawa Verification Centre on arm's length/private sector requirements;
- a provincial GHG data management and research facility, particularly focused on GHG capture and storage in the agriculture, transportation and forestry sectors; and
- a national/international soil and biomass testing centre.

The expansion of the proposal to address other aspects of the offset system should be explored with Pinawa.

The national offset system may require that projects be reviewed or validated in advance to determine whether the project and the quantification methodology, including the baseline, meet the system rules. Projects that are validated are then eligible to create reductions/removals. There are several options for a Manitoba role in validation, including:

- the main national validation office;
- a regional (Western Canada) office for validation; and
- a specialized validation centre with expertise in a particular area (e.g., forestry, agricultural soils and other farm management practices; landfill gas; or geological sequestration).

For supporting information on Recommendation #2, see page 24.

Recommendation #3:

Establish Winnipeg as a centre for Canada's domestic emissions trading system.

Take advantage of the province's central location, low-emission economy and history as a trading hub to make Winnipeg a centre for trading within Canada's domestic emissions trading system.

The volume of trading in Canada's domestic emissions trading system represents an opportunity to establish an exchange service to handle the trades. Winnipeg's central geographic location, its clean-energy, low-emission economy, and its expertise in commodity exchange make the city an ideal location for such trading.

The task force is also recommending that the province jumpstart Manitoba's natural advantage in the supply of offsets by contributing to the purchase of offsets as early as this year (*Recommendation #13*). These purchases could be conducted through a trading exchange.

For supporting information on Recommendation #3, see page 27.

Recommendation #4:

Evaluate and communicate offset opportunities.

The provincial and federal governments should assess the scientific and economic feasibility of offset opportunities that exist and be engaged in the federal government's offset eligibility decisions.

The potential for Manitoba to supply offset credits for the domestic emissions trading system through sequestering carbon and reducing greenhouse gas emissions is significant. Four areas appear to be particularly promising:

1. livestock rearing and manure management;
2. cropland and grazing land management;
3. afforestation and reforestation; and
4. landfill gas capture.

While Manitoba has a natural advantage in these areas, there are important decisions yet to be made at the national level that can affect these opportunities in Manitoba. First, the federal government has until 2006 to decide whether to include forest management and cropland and grazing land management practices in its GHG accounting. This is largely a scientific decision of whether these practices will be net carbon sources or net sinks. If they are not included in the accounting, they will not be eligible as offsets. Inclusion of landfill gas is also in question. The federal government might decide that landfill emissions should be regulated outside of the emissions trading system, thus making them ineligible for offsets.

Second, if agriculture and forestry sinks are included, the date of eligibility of carbon sinks that have already been developed through improved agricultural and forestry practices still needs to be decided.

Box 3. The federal government's dilemma over offsets.

Increasing the scope of the carbon offset system (e.g., transportation, etc.) and providing early recognition of sinks will increase the availability of offset credits and thus make it more efficient for large final emitters to reach their 55 Mt target. However, it does not help Canada make further emission reductions, reductions that would make it easier for Canada to meet its Kyoto commitment. This is the federal government's dilemma in considering increasing the scope of the offset system.

Third, information about the cost-effectiveness of the various offset opportunities is patchy. Reasonably accurate information of this nature will be important for effectively developing Manitoba opportunities and for engaging the federal government on offset eligibility issues.

Fourth, in relation to the agriculture sector, ownership of offset credits (agricultural producer or federal government) is not entirely clear given that the federal government has funded land practice activities via the new Agriculture Policy Framework (e.g., Greencover Canada) that also qualify as offset credits in the proposed domestic emissions trading system. This area requires further analysis and consultation.

For supporting information on Recommendation #4, see page 28.

Recommendation #5:

Promote a clean electricity network.

Pursue development of a clean electricity network through continued pursuit of infrastructure investment, through the Climate Change Plan, for an electricity transmission line from Manitoba to Ontario; and pursuit of energy policies that foster the integration of emerging and distributed renewable electricity sources such as wind, solar, geothermal and biomass.

Emissions trading is only one of several policy instruments being used in the federal government's *Climate Change Plan for Canada*. Others include innovation and technology investments, infrastructure investments, partnership funds and other targeted measures.

There is no doubt that reducing future GHG emissions in Canada will involve an increased use of conventional renewable energy such as hydro-electricity and emerging renewable sources such as wind, solar, geothermal and biofuels. Efforts directed toward fostering a distributed network of conventional and emerging renewable electricity sources will help Canada reduce its GHG emissions.

A *clean electricity network* can be fostered in a number of ways. For example, hydro and wind resources are linked to those specific geographic locations where wind and water occur, consequently they are often situated long distances from markets. These sources must be connected by a capable transmission system in order to be useful. Such a network would connect the clean electricity sources in Manitoba to the large customer groups in Ontario.

Another way of fostering a clean electricity network is the integration of emerging renewable sources such as wind, solar, geothermal and biofuels into our current hydroelectricity grid. Many of these sources would be distributed, such as solar panels from individual homes or neighbourhoods, or wind turbines on individual farms or groups of farms. Studies have shown that Canada is falling behind other industrialized nations due to a lack of supporting market structures and the absence of appropriate government policies. Facilitating the integration of these emerging renewable sources with appropriate policies to provide incentives and to remove barriers to integration would help advance a clean electricity network.

A clean electricity network with increased transmission capacity and integration of distributed emerging sources would also enhance energy security and reliability in Canada. With regard to transmission lines, the issues and the opportunities are much the same as those faced by leaders when they considered the National Railway, Trans Canada Highway, St. Lawrence Seaway or the continental gas pipelines.

For supporting information on Recommendation #5, see page 30.

Recommendation #6:

Integrate emissions trading with Manitoba's other strategic interests.

Consider the development of the emissions trading system in light of Manitoba's broader strategic interests.

Manitoba has much to gain from a domestic emissions trading scheme, but it has other strategic interests to bear in mind at the same time. Given the broad range of opportunities that have already been identified—in the hydro-electricity, agriculture and forestry sectors particularly—it is likely that many synergies exist between emissions trading and Manitoba's other interests.

Manitoba also has a strategic interest in developing an ethanol industry,[8] which can have positive impacts on the environment in general and GHG emissions in particular. As the specifics of the trading system are developed, the synergies with federal and provincial ethanol programs need to be kept in mind.

Box 4. Manitoba's East-side Planning Initiative.

Manitoba's East-side Planning Initiative is one example of the potential synergies between emissions trading and broader pursuits in Manitoba.

The East-side Planning Initiative will allow interested communities and stakeholders to develop a balanced, integrated and sustainable plan for the area east of Lake Winnipeg. East-side Planning is a pilot for broad area planning. Broad area plans are meant to ensure future land, resource and development decisions address the environmental, social, health, cultural and economic needs of the public, local communities, First Nations and other stakeholders.

Among the many issues and opportunities identified during the initiative's preliminary discussions are forest resources including carbon storage and sustainable forest harvesting, and consultation in future hydro transmission facilities. These issues all play a role in domestic emissions trading and, therefore, integrating efforts to realize opportunities in emissions trading and offsets with ongoing East-side planning efforts would be beneficial.

For supporting information on Recommendation #6, see page 31.

Recommendation #7:

Encourage the formation of offset pools.

Encourage the early formation of offset "pools" in Manitoba's agricultural and other sectors.

A major problem facing the development of offsets is administrative cost. Given that the financial returns on individual projects may be modest, particularly in the area of cropland management, administration costs may render the entire process uneconomic.

For this reason, the government has recognized that the pooling of smaller projects into larger units may be necessary for these projects to have any chance of being implemented. The *Offset System Discussion Paper* (pp. 43–46) gives further details about how this might work. There could be a role for "private-sector aggregators" of individual offset projects.

Representatives of the agricultural community have indicated that they favour "pooling" of offset projects as a way of minimizing administrative costs. The provincial government could drive this idea forward by contacting potential pool members in the province, explaining to them the principle of offset pooling and seeking their views on the subject. This could form the basis of a pilot project that would define and test the operating policies of the pools.

Pooling may also provide an effective mechanism for making it practical to include emission reductions from small sources in the buildings and transportation sectors in the offset system. Municipal and local governments, community groups and private entities may be able to aggregate a number of small reductions in a variety of areas, including:

- transportation demand management programs;
- fleet conversions to alternative fuels; and
- energy retrofits of public and private buildings.

For supporting information on Recommendation #7, see page 32.

Recommendation #8:

Establish a streamlined process for small projects.

Recommend to the federal government that a streamlined review and verification process be developed to support participation by small projects in the offset system.

Small offset projects are particularly important for Manitoba, where most companies are small to medium-sized enterprises (SMEs). Encouraging participation by small projects in Manitoba and the rest of Canada is also important to achieving the main objectives of the offset system, including enhancing market liquidity and creating an incentive for investment in Canada.

However, proponents of small offset projects face a number of barriers to participation in the offset system, including:

- A number of the costs of participation (project development, project validation, verification/certification of reductions/removals) are relatively fixed and independent of the size of the reduction/removals. These transaction costs can represent a significant proportion of the total value of a small offset project.
- SMEs are likely to lack knowledge of the system and lack the capacity to address some of the requirements of the process. This may increase transaction costs relative to larger proponents.

Some of these barriers could be reduced by establishing separate requirements for small projects, as has been done in the international context for the Clean Development Mechanism. Options for streamlining the process for small projects include:

- highly-standardized baselines and quantification methodologies;
- simplifying the information requirements for the project review;
- limiting or eliminating the project validation stage—i.e., automatic approval for certain types of activities, or a simple checklist approach to validation;
- no requirement to determine leakage (offsite or indirect impacts from project activities);
- simplified monitoring and reporting requirement; and
- reduced requirements for verification.

For supporting information on Recommendation #8, see page 33.

Recommendation #9:

Develop mechanisms to complement actions that support adaptation.

Develop and implement mechanisms that can harness the emissions market to stimulate more adaptation activity than would otherwise take place and, therefore, reduce the public cost of adaptation. Such action should be taken at provincial and federal levels.

There are essentially two ways to respond to climate change—mitigation and adaptation. Mitigation tries to directly address the source of the problem by focusing on efforts to reduce and/or sequester greenhouse gas (GHG) emissions. Adaptation addresses the impacts of a changing climate by helping societies enhance their resilience.

Historically, Manitoba has financed programs and projects to adapt to climate variability—the Red River Floodway, for example. Future climate change will increase such need for adaptation, and the cost to the public and private sectors and to communities could be enormous.

Developing mechanisms that support offset projects that simultaneously mitigate greenhouse emissions and increase our resilience to climate change could represent a win-win-win opportunity for:

- Manitoba government – reducing the public-sector cost of climate change adaptation program and project expenditures;
- Manitoba communities – creating an incentive for implementing projects that increase Manitoba's resilience to future climate change; and
- Manitoba business and industry – reducing the private-sector cost of purchasing emissions offsets via cost-sharing mechanisms with the public sector and the offset project proponents.

Possible mechanisms include direct cost-sharing,[9] public recognition of offset purchases that support adaptation initiatives and other outreach/communication programs.

Box 5. Projects having a mitigation and adaptation co-benefit.

Projects that could have both mitigation and adaptation benefits include, but are not limited to the following:

- zero and minimum tillage;
- riparian zone management;
- shelterbelt planting and maintenance;
- wetlands habitat enhancement;
- reclamation of degraded lands; and
- rural municipal drainage schemes.

For supporting information on Recommendation #9, see page 33.

Recommendation #10:

Promote Manitoban and Canadian technologies internationally.

Promote Manitoban and Canadian technologies via the Clean Development Mechanism, Joint Implementation and Russia's Green Investment Scheme.

Canada will engage in international emissions trading (IET) as one way to meet its Kyoto commitment. IET will have its own set of rules separate from domestic emissions trading.

There are opportunities for Manitoba and Canada to export innovative technologies related to emissions reduction to other countries via two specific IET mechanisms:

- *Clean Development Mechanism* (CDM, Article 12 of the Kyoto Protocol) – Allows developing countries to participate in the flexibility provisions of the Kyoto Protocol; and
- *Joint Implementation* (JI, Article 6) – Project-based reductions between countries that have taken on specific reduction commitments.

This type of innovation export serves the purpose of promoting sustainable international development while at the same time contributing to our domestic economy. Canada has existing and emerging clean technologies, and also a government program for encouraging their development (Sustainable Development Technology Canada). Synergies between emerging technologies and emissions trading should be explored. Domestically and internationally, more sustainable technologies will bring business opportunities and climate improvements.

One concern in relation to IET is the large number of "surplus" international emission credits that Russia will be able to sell into the market.[10] Commonly referred to as "hot air," the concern is that countries will meet their targets without taking any real reductions. Instead, it would amount to a wealth transfer to other countries with no apparent benefit to Canada other than meeting Kyoto obligations. A Green Investment Scheme has been proposed by Russia to alleviate this concern, and within this scheme there are opportunities for Manitoba and Canada to export technologies.

For supporting information on Recommendation #10, see page 36.

2008 is too late!

Recommendation #11:

Propose to the federal government to start the domestic emissions trading system early by setting targets for 2006–2007.

Propose to the federal government to start the Canadian domestic emissions trading system early by setting targets for LFEs beginning in 2006. Consider allowing LFEs to bank allowances/credits into the 2008–2012 period.

An early start to the domestic emissions trading system is the most effective mechanism to provide incentive for early action and helping Canada to be better able to meet its Kyoto commitments. An early start will also provide the kind of experience that will enable Canada and Canadians to take full advantage of emission trading opportunities in the Kyoto commitment period.

While other elements of Canada's climate change program (i.e., targeted measures) are being implemented now, the proposed emission trading system (LFE targets and the offset system) are not scheduled to take effect until 2008. This means that there are no incentives for LFEs and other entities to start reducing emissions prior to 2008. It also means that Canada and Canadian entities will have no experience with full-scale emission trading prior to 2008 and the start of international emissions trading. This lack of experience is likely to place Canadian firms at a disadvantage relative to those in other countries. It also means that there will not be an opportunity to "work out the bugs" in the Canadian emissions trading system prior to the point at which it must be fully operational and integrated with the international system.

Other jurisdictions are starting their GHG emissions trading systems early—most notably the European Union. The EU has agreed to implement an EU-wide greenhouse gas emissions trading system (EU ETS) that is scheduled to come into effect in January 2005. If implemented as expected, the EU ETS will be the largest emissions trading system in the world and the first multinational system. The system will be implemented in two phases: Phase 1 implements a carbon dioxide cap-and-trade system for the period 2005–2007; Phase 2 will address the first Kyoto commitment period. Estimates made on behalf of the European Commission suggest that the proposed ETS will reduce total abatement costs by some 24 per cent, leading to cost savings of some €2.1 billion/year by 2010.[11]

For supporting information on Recommendation #11, see page 40.

Recommendation #12:

Ensure that the federal government provides fair treatment and recognition of large final emitters (LFEs) and offset-eligible investments pursued in the 1990s.

- Manitoba should recommend that the federal government set intensity targets for large final emitters to reflect the early emission reduction actions taken since 1990 by some sectors, such as pulp and paper. This is consistent with the commitment by federal/provincial/territorial energy and environment ministers that early actors would not be penalized by the design of the emissions trading system.
- The design of the offset system should ensure that there are no incentives to reverse existing removals, for example, by setting a project eligibility start-date of 1998 for activities that enhance agricultural soil sinks.

The proposed emissions trading system does not provide credits for pre-2008 reductions and removals that could be banked into the Kyoto Commitment period. Federal, provincial, and territorial energy and environment ministers committed in 1998 to create such a system, and established the Credit for Early Action Issue Table to evaluate options. However, it was difficult to resolve a number of the issues raised by early crediting, and ultimately the ministers were only able to agree to provide baseline protection. This affects LFEs as well as offset proponents.

Providing offset credits for past actions will require that the federal government purchase international compliance units in the same amount to cover the increase in LFE emissions, or make additional investments elsewhere in the economy to reduce emissions.

The start date for offset project eligibility may also create an incentive to reverse offset-related activities that have taken place before the start-date in order to make them eligible for offset credits. In most sectors this is an unlikely scenario, however, in the case of agriculture, management practices that sequester carbon, such as low-till, can be reversed.

For supporting information on Recommendation #12, see page 41.

Recommendation #13:

Create sufficient incentive for emission reductions and removals prior to 2008.

- Manitoba should recommend to the federal government that it should identify how many credits might actually be claimed under an early offsets program, and should evaluate the effectiveness and cost of providing offset credits for pre-2008 reductions/removals where doing so is likely to accelerate and/or increase reductions/removals in the Kyoto period.
- At a minimum, the federal government should set a project eligibility start date of no later than 2003 (for projects other than agricultural soil sinks where the start date should be set at 1998 to eliminate perverse incentives) in order to provide some incentive for pre-2008 investments in offsets.
- The federal government should also be encouraged to introduce other programs and incentives for early action, such as an expanded Pilot Emission Removals, Reductions and Learnings Initiative (PERRL) program.
- The Manitoba government could contribute to an expanded PERRL-like program in Manitoba.

The proposed emissions trading system essentially only provides an incentive for reductions/removals during the commitment period (2008–2012). This not only delays urgently needed action to combat climate change, but it delays the development of the offset market, a market in which Manitoba has a natural advantage.

Recommendation #11 called for an early start to the LFE and offset trading system. If it is not feasible to start the system prior to 2008, then the federal and provincial governments need to design incentives for early action among the LFEs and potential offset proponents.

Targeted measures developed by the federal government in other sectors provide incentives to begin reducing emissions and developing carbon sinks well before 2008 (e.g., PERRL). Internationally, the Clean Development Mechanism allows credits to be created for reductions/removals starting in 2000. The current design of domestic system provides no similar treatment. The federal government's *Offset System Discussion Paper*[12] sought recommendations on treatment for early action, and is still open to suggestions.

Box 6. Pilot Emissions Removals, Reductions and Learnings (PERRL) Initiative.

Started in the fall of 2002, this initiative will provide $13.2 million to purchase emissions reductions and removals from eligible projects from its inception until 2007. The four strategic sectors eligible to participate are: landfill gas capture and storage; CO_2 capture and geologic storage; renewable energy; and biological sinks. PERRL is a pilot program and although it appears to be a cost-effective mechanism, the solicitation of new eligible projects into this program beyond the fall of 2003 is uncertain.

Manitoba funding an expanded PERRL-like program in Manitoba could be justified in four ways. First, it would repay Manitoba to develop a set of definitions and rules for offsets, in order to contribute Manitoba-friendly input to the federal process, in an area where Manitoba has a long-term economic interest. Second, it would introduce Manitoba offset producers to the concepts and operations of a trading system, giving them an important leg up when the national system starts running. Third, the intermediate institutions, such as pooling organizations, could begin operating, again developing a better base in Manitoba. Finally, emphasis could be put on developing trading systems that have a Manitoba base.

For supporting information on Recommendation #13, see page 43.

Recommendation #14:

Work to develop a long-term open emissions trading market in which Manitoba offset producers can trade.

The provincial government should work to develop a long-term open market in which Manitoba producers can trade.

Given Manitoba's natural advantage in offsets, particularly through the agriculture and forestry sectors, providing early experience in the provision of offset projects would be beneficial for two reasons: it would allow Manitoba to influence the design of the rules for the offset trading system, and it would give Manitobans a head start in understanding and utilizing the system.

The task force heard presentations from three different trading groups, each of which had particular strengths for helping Manitoba supply its offsets to emissions trading systems:

1. the Winnipeg Commodity Exchange, and its proposed *Canadian Climate Exchange* – a potential centre for Canada's proposed domestic emissions trading system;
2. the Chicago Climate Exchange (CCX) – a "self-regulatory exchange that administers the world's first multinational and multi-sector marketplace for reducing and trading greenhouse gas emissions"; and
3. Forexster's Web-based decentralized network emissions trading system – an innovative foreign exchange-like trading system that could connect emissions trading systems from around the world.

In the long run, it will benefit Manitoba producers of offsets to have the most open possible trading system, in order to attract the largest number of buyers and sellers.

For supporting information on Recommendation #14, see page 44.

We need to get the trading system right in the long run

Manitoba's clean-energy, low-emission economy is in a position to benefit from an emissions trading system that provides clear price signals and incentives to switch from higher-emitting technologies and practices. However, the proposed system does not provide any significant incentives. This is largely due to a number of trade-offs made to accommodate competitiveness concerns, especially given the U.S withdrawal from the Kyoto Protocol. These have limited the effectiveness of the system in delivering reductions, and limited the benefits to Manitoba's economy.

Climate change is a key 21st century issue for Canada and the world. It is important that we move to a domestic emissions trading system that provides the right incentives for the economy and environment. In the post-Kyoto period (beyond 2012), it will be even more critical to design an effective system, since much more significant reductions in emissions will be required.

In the long term, achieving the full economic and environmental benefits of an emission trading system for Manitoba and Canada will likely require a different set of incentives than the current proposal. Recognizing the shortfalls in the current domestic emissions trading system, and also recognizing that planning for the next commitment period will begin within a few years (planning for the 2008 commitment period started over 10 years ago), the task force makes three recommendations for a better system post-2012.

Recommendation #15:

Seek the participation of the United States in emissions trading.

- The Manitoba government should explore opportunities for cross-border trading with emerging trading systems within the United States in effort to explore potential demand for GHG offsets and to encourage U.S. participation in GHG reductions and removals.
- The Manitoba government should encourage our federal government to ensure that future international agreements to limit greenhouse gas emissions involve U.S. participation on a basis that is equitable for Canada.

U.S. participation is critical to the effectiveness of international agreements to limit greenhouse gas emissions, and is important to Canada because of the linkages between the two economies.

Multiple GHG emissions trading systems are emerging in the United States despite the fact that they have not ratified the Kyoto Protocol. Voluntary trading among major U.S. corporations and cities has

already begun through the Chicago Climate Exchange, of which Manitoba Hydro is a member. In 2001, eastern Canadian premiers reached a co-operative agreement with the New England governors on a climate change action plan. The New England states have moved ahead and are developing a regional GHG emissions trading system with targets.

These are examples of how pockets of demand for GHG offsets are beginning to appear. As these areas of demand are developing it would make sense for Manitoba to have influence on them so that we can potentially sell offsets into them.

For supporting information on Recommendation #15, see page 47.

Recommendation #16:

Expand the coverage of the emissions trading system.

The Manitoba government should work to ensure that the future emissions trading system is as broad as possible—the system should include all sectors and sources for which it is practical, feasible and cost-effective to measure, monitor and report emissions.

The larger the emissions trading market, the more opportunities there are to reduce emissions, and the lower are the overall costs of meeting Canada's emission target. An expanded carbon market is also likely to result in a greater proportion of emission reductions being achieved in Canada, rather than through purchases of international credits.

For supporting information on Recommendation #16, see page 49.

Recommendation #17:

Begin discussions on appropriate provisions affecting investments for the long-term system.

Manitoba should play a leadership role by beginning a dialogue with the federal government and other stakeholders on developing appropriate provisions affecting investments for the long-term trading system.

Task force members discussed the post-2012 emissions trading system and believed it important to begin serious discussions to design the most effective and productive formula. A majority of members believed that a trading system should allow for clear market signals and that this would require absolute emissions targets instead of intensity-based targets, an uncapped price of carbon, and a move toward auctioning a significant portion of allowances in future commitment periods.

Two task force members, Bob Puchniak and Kerry Hawkins, did not support these modifications to the investment provisions which, in their current form, provide certainty for future investments in energy projects.

For supporting information on Recommendation #17, see page 50.

The remainder of this report gives supporting information for the 17 recommendations and also provides the following: summary information on Canada's proposed domestic emissions trading system; a description of who is affected in Manitoba; a description of opportunities for emissions reduction and removal offsets in Manitoba; and a summary of the administrative requirements of the proposed domestic emissions trading system and the opportunities these might present to Manitobans.

Supporting Information for the Task Force Recommendations

Manitoba has a natural advantage in offsets and clean electricity

Recommendation #1:

Provide incentives for non-emitting electricity and energy efficiency.

Recommend to the federal government that emission reductions from new low-impact, non-emitting electricity and energy efficiency be included in the backstop/covenant system or be eligible to create offset credits.

Background

The proposed backstop/covenant system is expected to set emission intensity targets for thermal electricity generation, rather than all electricity generation. Thermal generators will be allocated allowances each year equal to current production (in megawatt hours [MWh]) multiplied by an emission factor. It is not known whether there will be different emission factors for different types of thermal generation (coal, oil, gas). Producers of electricity from new low-impact, non-emitting sources will not be allocated allowances.

The federal government's offset discussion paper proposes that projects that increase renewable electricity supply or reduce electricity demand would not be eligible for offsets, as these are captured by the LFE backstop/covenant system and/or other programs.[13] Concerns were also expressed in stakeholder discussions that there could be double-counting of emission reductions if new non-emitting supplies or energy efficiency were eligible for offsets.

Discussion

The analysis below shows that:

1. New non-emitting supplies and energy efficiency are not captured by the proposed LFE backstop/covenant system. The system provides very little incentive to invest in new non-emitting supplies or energy efficiency.
2. Incremental new non-emitting electricity and energy efficiency could be included in the emissions trading system by either providing allowances for production from these sources or by making them eligible to create offset credits. Including these sources would correct distorted incentives, and would not result in double counting. If allowances are provided only to incremental ("beyond business-as-usual") investments, the allocation to thermal generators would not be affected.

Intensity-based targets for thermal generators distort the incentives for reducing emissions from electricity generation. The targets provide very little incentive to reduce emissions by fuel-switching to lower-emitting sources or by encouraging energy efficiency. If a thermal generator fuel-switches to lower-emitting sources or invests in energy efficiency, the number of allowances the generator receives is reduced proportionately. Table 2 shows how the proposed intensity targets create different financial values for different emissions reduction options. For example, if a generator reduces emissions by switching from coal to natural gas (Case 1 in Table 2), the generator's allocation of allowances is unchanged, and the generator receives full market value for the surplus reductions created. However, if a generator switches from natural gas to renewable energy (Case 3), the number of allowances received is reduced, and the actual surplus of allowances created is much smaller (= reduction in emissions minus reduction in allowances). This means that the value of fuel-switching to non-emitting is much reduced in terms of market value per tonne. Table 2 shows that if allowances/permits trade at $15/tonne, then there is a $15/tonne incentive to fuel-switch from coal to natural gas generation, because

the allocation of free allowances is unchanged, and each tonne of emissions reduction is surplus. However, there is only a $10.50/tonne incentive to switch from coal to new-non emitting sources, and a very small incentive of $2.14/tonne to displace natural gas generation with new non-emitting supplies or energy efficiency. This is because in these cases the generator now receives fewer free allowances.

The scenario shown in Table 2 is only one of a number of possible intensity-based allocation scenarios. The scenario in Table 2 is the simplest—it applies a single allocation factor to all thermal generation. Other approaches could differentiate between new thermal and existing thermal generation (or between existing thermal of different vintages), or could differentiate between different types of thermal generation (e.g., coal and gas). Approaches that apply a single factor to new generation will provide the most incentive for investment in new lower-emitting generation. However, all of these approaches allocate allowances only to thermal generation—with the result that there is still a much lower financial incentive to switch to new non-emitting electricity or energy efficiency.

These distortions can be addressed by including new non-emitting supplies in the backstop/covenant system or by making them eligible for offset credits (but not both). If energy efficiency projects were made fully eligible to create offsets, electricity consumers could claim credit for projects that reduce their electricity consumption. (Under the currently proposed system, emitters can only claim credit for reductions in fossil fuel use.)

A key point is that new non-emitting electricity supplies and energy efficiency can be made eligible for allowances or offsets without creating any double counting of reductions, and without increasing the total number of allowances issued beyond the business-as-usual scenario. This is possible because when these resources displace or avoid thermal generation, then thermal generation is reduced from BAU levels, and thermal generators receive fewer allowances than in the BAU scenario (under the proposed intensity-based system). The reduction in allowances can be allocated to new non-emitting supplies or energy efficiency without increasing the total supply of allowances/credits or compromising the 55 Mt LFE target.

The inclusion of new non-emitting/energy efficiency in the system does raise some challenging quantification issues:

1. Is thermal electricity production actually reduced? Or is the increased power production simply exported? Electricity exports will be determined primarily by demand in the U.S, not by climate policy in Canada, so in the longer term changes in the electricity supply mix in Canada are unlikely to affect exports. It is important to note that the risk of production increases beyond BAU levels also exists in other sectors. However, the federal government has agreed to accept the responsibility for emissions associated with increases in production in these sectors beyond forecast BAU levels (since targets are intensity-based), and the same principle could be applied here. However, if there are concerns that full displacement of thermal generation would not occur, then the allocation factor for new non-emitting generation or energy efficiency could be discounted slightly to reflect this.
2. What emission factor should be used? The mix of power generation varies considerably across the country. The most straightforward approach would apply a single allocation factor to new non-emitting and energy efficiency across the country. This would reduce the costs of quantifying, measuring and verifying reductions, and could make an important contribution to minimizing transaction costs. There are also other approaches that try to capture more accurately the marginal impact of new non-emitting supplies in different circumstances. In Manitoba, new generation is likely to be low-emitting, so the first approach—a single national factor—would be of more benefit to Manitoba energy efficiency and renewable energy projects.

There are also questions related to whether the new non-emitting supplies or energy efficiency programs are already included in the BAU scenario and the overlap with targeted measures. However, these are the same quantification issues that are raised by other offset projects that are currently eligible to create offsets.

New investments in non-emitting electricity supplies and energy efficiency are absolutely critical to a lower-emission future. Using the emissions trading system to provide financial incentives for these investments provides a key price signal to the market.

While there are challenges associated with including new non-emitting electricity supplies and energy efficiency in the emission trading system, they do not provide a strong rationale for excluding these sources from eligibility for offsets/allowances.

Table 2. The value of different electricity supply options.

This table shows the impact on the allocation of allowances of different electricity supply choices, and the value of those choices in terms of the change in CO_2 emissions liability (assuming allowances/permits trade at $15/tonne). The analysis shows the wide range of incentives provided for different marginal supply options, from a value of $15/tonne for fuel-switching from coal to gas or improved thermal efficiency, to a value of $2.14/tonne for new non-emitting or demand side management (DSM) that displaces natural gas combined cycle as the marginal resource. The analysis assumes that the allocation factor for all thermal generation is 300 tonnes/gigawatt hour (GWh). Different allocation factors will give different results.

Marginal Electricity Supply Options	Change in thermal production (MWh)	Change in total production (MWh)	Change in emissions (tonnes)	Change in allocation (tonnes)	Change in liability (emissions - allocation)	Value of change in liability (total $)	Value of change in liability ($ per tonne)
1. Fuel switch coal to gas (1,000 MWh)	0	0	-650	0	-650	$9,750	$15.00
2. Fuel switch coal to non-emitting (1,000 MWh)	-1,000	0	-1,000	-300	-700	$10,500	$10.50
3. Fuel switch gas to non-emitting (1,000 MWh)	-1,000	0	-350	-300	-50	$750	$2.14
4. Energy efficiency or DSM from coal (1,000 MWh)	-1,000	-1,000	-1,000	-300	-700	$10,500	$10.50
5. Energy efficiency or DSM from gas (1,000 MWh)	-1,000	-1,000	-350	-300	-50	$750	$2.14
6. Increase coal efficiency by 20% for 1,000 MWh	0	0	-200	0	-200	$3,000	$15.00
7. Increase gas efficiency by 20% for 1,000 MWh	0	0	-70	0	-70	$1,050	$15.00

Assumptions:

1. Average emissions by fuel: Coal = 1,000 tonnes/GWh; Gas = 350 tonnes/GWh
2. Allowance allocation mechanism: 300 tonnes/GWh thermal electricity production
3. Allowance (permit) price = $15/tonne

Recommendation #2:

Establish a national offset office in Manitoba.

Recommend to the federal government the establishment of an offsets centre in Manitoba. The centre could carry out the following:

- Technical support and outreach to project proponents, including the development and dissemination of standard methods (or protocols) for quantifying reductions and removals. These functions are needed to minimize project development and transaction costs, especially in the farm sector. While the federal government is expected to provide some of these services, there is likely a need for an "on-the-ground" presence in Western Canada to provide direct support to proponents.
- Validation of offset projects – as the national validation office or as a regional or sectoral authority responsible for reviewing reduction/removal projects and determining their eligibility for the offset system.
- Research and technical support for offsets.

There are a number of new functions that will likely be needed to support the operation of an offset system in Canada, including verification, project validation, technical support and outreach and a project registry. This section reviews the potential for a federally-funded offset centre based in Manitoba to deliver one or more of these functions.

The discussion is necessarily preliminary, as key policy decisions on offset rules must be made before the governance and administration of the offset system can be determined. Some of the elements discussed here may not be part of the offset system, or the functions may be delivered through other mechanisms.

Verification

Verification is the process of confirming that reductions/removals have actually occurred and have been measured accurately according to an established or pre-approved quantification methodology or protocol. Verification is a relatively mechanical function.

Most offset systems require that reductions/removals be verified either by the government program authority or by an independent third party. Participants in the national offset consultations carried out in June 2003 were strongly in favour of verification by independent third parties. If private sector verifiers are responsible for verification, there will likely have to be a process or a system for accrediting verifiers. Verifiers will be required to have specified expertise and follow standards of practice. The accreditation function could be carried out either by the federal government or by professional associations, many of which have existing certification processes. A number of engineering/accounting firms are well positioned to take on this function, and have gained experience in domestic and international markets. In fact, Manitoba has two Environmental Technology Verification Entities in operation, accredited under ETV Canada, that could take on this function immediately.

In addition, Manitoba engineering/accounting firms could also become accredited verifiers, as the verification function is unlikely to be carried out by government.

Project validation

The offset system may require that projects be reviewed or validated in advance to determine whether the project and the quantification methodology, including the baseline, meet the system rules. Projects that are validated are then eligible to create reductions/removals. The system may also require that validated projects be registered in a public database (offset project registry).

The validation step may not be required if the offset system includes a very clear and well-defined set of rules for project eligibility, baselines and quantification of reductions/removals. However, if the system is relatively open—as proposed by the federal government and many stakeholders—then the rules and criteria may be fairly general and at the level of principles. For some projects at least, eligibility, baselines and quantification methods are uncertain and will have to be determined on a case-by-case basis. Determining eligibility after the fact—at the same point as verification—would introduce considerable risk for proponents.

The validation process would evaluate the project and the quantification method in advance. This would provide investors and proponents with up-front assurance that the project meets the eligibility criteria, and help ensure that proponents do not devote resources to quantifying reductions from projects that are ineligible.

The validation phase differs significantly from verification. Validation requires an assessment of whether projects meet fairly general eligibility criteria and also judgments on whether baselines reflect "business-as-usual" conditions. This requires a range of expertise—economic, scientific, engineering and financial—and a significant exercise of judgment, much more so than verification. Validation processes can also vary considerably in terms of rigor, cost, complexity and time. The experience from Canadian offset pilots (e.g., GERT, PERT) is that fairly rigorous review processes can be lengthy and costly for proponents.

Validation could be done by accredited entities, as in the case of verification. However, the potential conflict between these functions could preclude both being done by the same entity. More importantly, if the cost of validation by accredited entities must be recovered from project proponents, this could add significantly to project costs.

Because of the potential cost, and the quasi-regulatory (project approval) nature of the process, validation might best be done by a government or independent (government-funded) agency under the direction or delegation of the program authority.

There are several options for a Manitoba role in validation, including:

- the main national validation office;
- a regional (Western Canada) office for validation; and/or
- a specialized validation centre with expertise in a particular area (e.g., forestry, agricultural soils and other farm management practices, landfill gas, other).

In all scenarios it will be critical to minimize the cost of validation for project proponents in order to encourage participation—through well-defined rules, standardized protocols, technical support and outreach.

Technical support and outreach

The proposed national offset system presents substantial barriers to participation by project developers, especially in the farm sector. The system is likely to be seen as complex, unfamiliar and risky. Unless the costs and risks of participation can be substantially reduced, the offset system will likely not be successful in generating a significant number of new projects.

There are two main areas in which a Manitoba-based offset centre could help reduce transactions costs and facilitate participation in the offset system: the development and dissemination of standardized quantification methods and protocols; and outreach and technical support to project proponents.

Development and dissemination of standardized quantification methods and protocols

There is strong stakeholder support for the federal proposal to allow an open offset system, rather than a limited set of eligible project types with prescribed protocols. In an open system, projects that meet a set of fairly general criteria and conditions will be eligible to create offset credits for reductions/removals.

While this open system will encourage creativity it also places much of the responsibility for the development of quantification protocols on project proponents. In particular, the proponent of the first project of a specific type will have to bear much of the cost of developing a standard quantification protocol that can then be used free of charge by later project proponents. An open system is also likely to require a more extensive validation or project review process than a system with prescribed protocols. Depending on the level of rigour, the validation process may be costly and cause time delays.

A verification or offset centre could help reduce these costs and facilitate participation by working with industry, the federal and provincial governments, and research institutions to collect and disseminate existing quantification protocols for a variety of offset projects, and to develop new quantification protocols where needed. This will be particularly important in the farm sector, where it will be necessary to develop simple but reasonably accurate methods to estimate soil carbon sequestration from agricultural practices under a variety of conditions.

Environment Canada's Verification Centre is expected to carry out some of this work, but there may also be a need for a specialized centre of expertise for agriculture or other areas.

The Local Government District of Pinawa has proposed that a Provincial GHG Data Management and Research Facility be established in Pinawa, drawing on local facilities and expertise. The current proposal focuses on research and technical support for:

- geological sequestration in Canada and globally, particularly in the area of risk assessment;
- verification and validation of programs based on current Environmental Verification Entity status and assistance to the Ottawa Verification Centre on arm's length/private sector requirements;
- a provincial GHG data management and research facility, particularly focused on GHG capture and storage in the agriculture, transportation and forestry sectors; and
- a national/international soil and biomass testing centre.

Other aspects of the offset system should be explored with Pinawa.

The expansion of the Pinawa proposal to address other aspects of the offset system could be explored with Pinawa.

It should be noted that some centres of expertise are already being established in Canada. In the area of geological sequestration these include:

- The Canadian CO_2 Capture and Storage Technology Network (CCCSTN), based at CANMET, which was established to coordinate activities undertaken by various groups and/or entities working on research, development and demonstration of national CO_2 capture and storage initiatives (http://www.nrcan.gc.ca/es/etb/cetc/combustion/co2network/htmldocs/aboutus_e.html).
- The Petroleum Technology Research Centre, a non-profit petroleum research and development corporation located in Regina, Saskatchewan (http://www.ptrc.ca).
- International Test Centre for CO_2 Capture, also in Regina (http://www.co2-research.ca/main.html).

In the area of forest carbon management, Pollution Probe is coordinating a group of government and industry partners that will be developing quantification protocols for forest carbon management through a series of pilots.

Outreach and technical support to project proponents

The development of well-documented standard methods or protocols for quantifying reductions/removals will help remove significant risks and barriers to offset project development. However, the complexity and unfamiliarity of the offset system is likely to prevent many proponents, especially among SMEs (small and medium-sized enterprises), from bringing forward new and innovative projects.

A Manitoba offset centre could help remove some of these barriers and simplify the process by:

- engaging in outreach activities to explain the offset system and process in Western Canada; and
- providing technical support and assistance to project proponents through the development and validation phase of projects. This is likely to be particularly important in the agricultural and private/individual forestry or urban/municipal forestry and landfill project sectors, which also must contend with small projects, limited margins and uncertain results.

Environment Canada's GHG Verification Centre is expected to carry out some of these activities as well, but there will also likely be a need for an "on-the-ground" presence in Western Canada to provide direct support to proponents.

There may also be value to having an agency separate from the regulator (federal government) providing advice and technical support to proponents. While this function could also be carried out by the private sector, the cost of technical support may be an issue for smaller proponents.

Project registry

There are several registry functions associated with the offset system and domestic/international emission trading:

- National registry – Canada is required to maintain a registry of international compliance units.
- Domestic compliance registry – A registry will be required to track ownership and retirement of domestic compliance units, including permits allocated to LFEs and offset credits.
- Offset project registry – a registry will likely be required to record information on offset projects.

These registries will need to be linked, but it is not necessary to house them in the same organization or location. One option is for a Manitoba verification centre to take on responsibility for the offset project registry. However, the federal government may also look to existing registries, such as VCR Inc., to deliver this function.

More details on the administrative requirements of the trading and offset systems are included in the section starting on page 75.

Recommendation #3:

Establish Winnipeg as a centre for Canada's domestic emissions trading system.

Take advantage of the province's central location, low-emission economy and history as a trading hub to make Winnipeg a centre for trading within Canada's domestic emissions trading system.

One potential avenue for making Winnipeg a centre for emissions trading in Canada is through the Winnipeg Commodity Exchange (WCE). The WCE has begun to explore the potential of an emissions trading market. On February 5, 2003, it officially launched the Canadian Climate Exchange as a separate entity within their organization. WCE staff have been working on emissions trading issues for over three years.

Another trading approach was presented to the task force by Forexster, and is discussed in Recommendation #14.

Box 7. The Winnipeg Commodity Exchange's Canadian Climate Exchange.

The WCE is Canada's only agriculture futures and options exchange and is internationally recognized. It has 116 years of experience in providing markets with a current trading volume exceeding four million contracts. Their experience includes:

- creating, implementing and facilitating trading in over 20 different cash and derivatives contracts;
- clearing both futures and physical products; and
- operating as an self-regulatory organization in a regulated environment.

The WCE has been consulting with industry and government to assess the potential for a Canadian emissions market. The Canadian Climate Exchange would operate as a separate entity under WCE Holdings Inc, parallel to the Winnipeg Commodity Exchange, the WCE Clearing Corporation and WCE Industry Services.

Source: Presentation to task force by William Hill, Winnipeg Commodity Exchange Inc., September 23, 2003.

Recommendation #4:

Evaluate and communicate offset opportunities.

The provincial and federal governments should assess the scientific and economic feasibility of offset opportunities that exist and be engaged in the federal government's offset eligibility decisions.

Assessing the science of agriculture and forestry sinks—knowledge for engaging the federal decision on offset system scope

At this time the decision on whether to include forest management and cropland and grazing land management in the offset system is largely a scientific one, but the economic implications to Manitoba are significant. So this question is inherently multi-dimensional from Manitoba's perspective, and especially so if the scientific debate is not resolved.

The decision at the international level appears to be an *in or out* kind of decision—for example, if forestry management is a source of carbon for Canada, it will not be part of the offset system. But on the ground, the scientific decision may not be so clear. For example, if in aggregate, forest management is a source at the landform level of detail, it may be that particular land use practices are in fact sinks. And if these particular land use practices are technically feasible, particularly economically beneficial to Manitoba, and help Manitoba to adapt to climate change (*see Recommendation #9*) it would be important to push for inclusion. Or conversely, if the offset is of little benefit to Manitoba, it may not be worth investing the time and money needed to push for inclusion. Additionally, the scientific uncertainty associated with the sink potential of different land use practices is likely not the same and, therefore, it will be important to have scientific information at the land use level rather than just the landform level.

The importance of being actively engaged in the science of sinks as demonstrated above also provides additional rationale for the research component of a Manitoba offset office (*see Recommendation #2*).

Assessing the technical and economic feasibility of Manitoba offset opportunities

A review of literature on the technical and economic feasibility of offsets indicate that Manitoba will have a natural advantage in supplying the offset system with credits. The information compiled by the task force in this regard is presented later. The information is patchy and given the importance of these opportunities to the Manitoba economy, it would be beneficial for the Manitoba government to promote further research into the technical and economic feasibilities.

This need also provides additional rationale for establishing an offset office in Manitoba (*see Recommendation #2*), one dimension of which could be to research these types of issues.

Engaging the federal decision process on offsets eligibility (scope)

The federal decision process on offsets eligibility has been slowed somewhat given recent changes in Ottawa. Comments on the *Offset System Discussion Paper* were collected throughout the summer and early fall of 2003. The design paper was originally scheduled for release in the fall of 2003; however, indications from Ottawa are that this may be delayed somewhat and will be in the form of a second draft and not a final design paper. In any event, the time to begin engaging the federal government on these offset issues coincides with the release of the task force's report.

Analyzing the ownership of emissions offset credits

There is uncertainty in the agriculture sector regarding ownership of credits that they create. It is not entirely clear what offsets the federal government will own as a result of initiatives in the new Agriculture Policy Framework (e.g., Greencover Canada), and what offsets can be developed by agriculture producers themselves. This area requires further analysis and consultation.

The agriculture sector is of the opinion that offset credits should be owned by those who create them, generally the operator of the land base. There are however, exceptions to this, particularly where government funding has gone into the development of the offset practice. The federal government could be credited with the portion that they funded. An example in the Agriculture Policy Framework is buffer strips, funded 30 per cent by the government. The agriculture sector believes that the federal government should own 30 per cent of the credit, not the entire credit.

Synergistic effects

It is worth noting that many of the offset activities that are described later have other benefits besides reducing atmospheric greenhouse gas concentrations. For example, reducing methane emissions from manure storage would help to eliminate the problem of odour, while actions to reduce the consumption of nitrate fertilizers would be beneficial to water quality. Similarly, planting large areas with native tree species—albeit not the fastest-growing varieties—could deliver substantial benefits for nature conservation.[14]

Many offset activities also have the co-benefit of helping Manitobans adapt to a range of potential climate futures. This aspect is discussed in detail in the task force's recommendation to develop mechanisms that support adaptation (*see Recommendation #9 page 13*).

If the business case for a particular offset project is not strong, one or more of these auxiliary benefits might tip the balance in favour of the project—provided that these other objectives do not render the scheme ineligible for offset credits.

Handling carbon sequestration offset projects separately from emission reduction offset projects

The scientific and other complexities of defining offset rules for sequestration projects are substantial, and may take some time to sort out. On the other hand, many potential offset projects are much sim-

pler, in terms of defining base lines and measuring reductions. If the design of the rules for each were separate, the easier projects could get under way as soon as possible, to the benefit of the project developers. Much more detail on possible offset opportunities in Manitoba is given in the section starting on page 63.

Recommendation #5:

Promote a clean electricity network.

Pursue development of a clean electricity network through continued pursuit of infrastructure investment, through the Climate Change Plan, for an electricity transmission line from Manitoba to Ontario; and pursuit of energy policies that foster the integration of emerging and distributed renewable electricity sources such as wind, solar, geothermal and biomass.

Continued pursuit of potential infrastructure investment through the Climate Change Plan

It is clearly necessary to have federal participation in the development of enhanced capacity in electricity transmission across Canada.

Manitoba's Energy Development Initiative notes that from a funding perspective, the federal government's much greater fiscal and borrowing capacity would enable it to borrow money at the lowest rates, and then to pay off any infrastructure investment (under its "accrual accounting" system), over the 40–80-year working life of the lines and stations provided.[15] It was also noted that the federal government would reap significant up-front tax revenues from the new transmission, hydro and wind-farm construction, putting them almost certainly into a *net positive* cash flow situation for many years after construction commenced. The fact that the employment on these projects will also occur in areas of traditional high unemployment should also be noted as an additional, important benefit. In short, the federal government can capture multiple environmental, economic and fiscal benefits.

Policies that support the integration of emerging renewable energy sources

A study conducted by Pembina Institute for Appropriate Development concluded that although Canada has an abundant source of emerging renewable energy sources, it is falling behind most industrial nations due to a lack of supporting market structures and the absence of appropriate government policies.[16] The report cites four types of barriers to renewable energy in Canada:

1. information barriers (e.g., lack of information on suppliers);
2. institutional and policy barriers (e.g., interconnection and operational barriers, market barriers);
3. financial barriers (e.g., lack of access to capital, lack of pricing of environmental externalities); and
4. technical barriers (e.g., intermittent supply).

For example, one type of policy barrier deals with interconnection, and this is often cited as the most severe for small-scale, distributed technologies. In some cases boiler code requirements are the barrier and include the requirement for a full-time operator even for small systems.

Understanding the range of barriers to emerging renewable electricity sources, and pursuing policy to reduce these barriers can help advance a *Clean Electricity Network* within Canada.

Box 8. Vulnerability of energy networks.

On the vulnerability of tightly coupled modern networks:

"We can take steps to reduce these vulnerabilities, by loosening the couplings in our economic and technological networks, by building into these networks buffering capacity of various kinds and, perhaps most importantly, by distributing the production of key goods and services. In the energy sector, this might mean greater use of decentralized, local energy production and alternative energy sources (like small-scale solar power) that make individual users more independent of the electricity grid. Clearly this policy would reduce economic efficiency, but the extra security of more stable and resilient production networks could far outweigh this cost."

The matrix of our troubles. Sarah Wolfe and Thomas Homer-Dixon. *Globe and Mail*, August 16, 2003, following the eastern North America power blackout.

A strengthened transmission system, and a set of policies that encourage its use by low-emission sources, can contribute both to reduced emissions and increase the security of Canada's energy supply.

Recommendation #6:

Integrate emissions trading with Manitoba's other strategic interests.

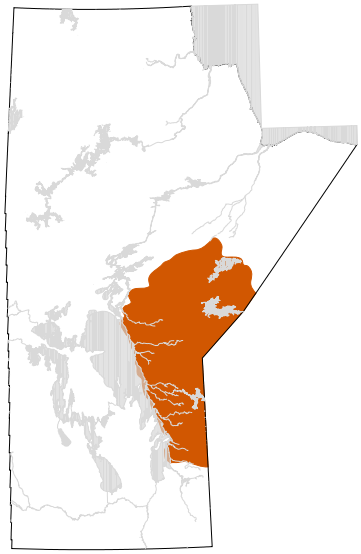
Consider the development of the emissions trading system in light of Manitoba's broader strategic interests.

Manitoba's East-side Planning Initiative is one such example of the potential synergies between emissions trading and broader pursuits in Manitoba.

The East-side Planning Initiative will allow interested communities and stakeholders to *develop a balanced, integrated and sustainable plan* for the area east of Lake Winnipeg (see Figure 2). Born out of the Manitoba government's 2000 Consultation on Sustainable Development Implementation (COSDI), East-side Planning is a pilot for broad area planning—integrated and coordinated planning that is based on the sustainability of the ecosystem. Broad area plans are meant to ensure future land, resource and development decisions address the environmental, social, health, cultural and economic needs of the public, local communities, First Nations and various stakeholders.

Among the many issues and opportunities identified during the initiative's preliminary discussions are forest resources including carbon storage and sustainable forest harvesting, and consultation in future hydro transmission facilities. These issues all play a role in domestic emissions trading, and therefore, integrating efforts to realize opportunities in emissions trading and offsets with ongoing East-side planning efforts would be beneficial.

Figure 2. Area covered in Manitoba's East-side Planning Initiative.



Recommendation #7:

Encourage the formation of offset pools.

Encourage the early formation of offset "pools" in Manitoba's agricultural and other sectors.

The *Offset System Discussion Paper* notes that a pooling approach would "provide an opportunity for producers wishing to participate in the offset system to join a formal entity representing an offsets pool." The paper further describes a pool as an "organized group of producers who adhere to a specified set of best management practices to produce offset credits in aggregate." A pool could be administered by the private or public sector, and in either case the pool would have to be "separate and distinct from the offset system regulatory bodies."

The discussion paper acknowledges that the agriculture sector has experience in both private and public sector cooperatives and could draw on this experience in developing options for the administration of pools. Manitoba's Keystone Agricultural Producers has had preliminary discussions in this regard (see Box 9).

Box 9. Keystone Agricultural Producers offset pooling ideas.

Beginning to sell in 2008 means we will be selling futures rather than cash, meaning we must have a system in place to protect producers from risk generated by sudden change (i.e., insurance, etc.). It is far better to begin collecting data of offsets created in 2004 to 2008 so that in 2008 we will be ready to sell cash offsets which have already been created and verified. There will be no risk to producers and no need for any risk management system.

This can be done by collecting the information through crop insurance agencies across Canada, many of whom already have land use practice data and are in a position to verify and pool this information. They do not, however, have any expertise in sales and it would be necessary to have someone in the marketplace representing these agencies.

Non-land use practice offsets usually associated with livestock enterprises could also be pooled but could also be sold individually. Money generated by these sales could be flowed back to the producer through these agencies either to individual producers or on an industry-wide basis. We prefer individuals to encourage participation. Costs of administration through this method would be very low relative to setting up independent systems. Producers would also be able to go in and out of the market based on their farm operation's flexibility.

Research as to the amount created by various offset activities needs to continue but basic information to start with already exists. Verifiers could either be independent individuals for firms or crop insurance staff could be trained to do some of this particularly adjusters who are seasoned employees.

Pooling may also provide an effective mechanism for making it practical to include emission reductions from small sources in the buildings and transportation sectors in the offset system. Municipal and local governments, community groups and private entities may be able to aggregate a number of small reductions in a variety of areas, such as:

- transportation demand management programs;
- fleet conversions to alternative fuels; and
- energy retrofits of public and private buildings.

For individual projects in these areas it may not be cost-effective to go through all the steps required to measure, monitor, report and verify reductions. However, if the activities can be aggregated, then the costs of creating offset credits—many of which are fixed and do not vary with the number of tonnes reduced/removed—can be shared over a number of projects.

Municipal and local governments may be particularly effective as aggregators of small reductions. One local government—the City of Chicago—has already joined the Chicago Climate Exchange.

Recommendation #8:

Establish a streamlined process for small projects.

Recommend to the federal government that a streamlined review and verification process be developed to support participation by small projects in the offset system.

Small offset projects are particularly important for Manitoba, where most companies are SMEs. Encouraging participation by small projects in Manitoba and the rest of Canada is also key to achieving the main objectives of the offset system, including enhancing market liquidity and creating an incentive for investment in Canada.

However, proponents of small offset projects face a number of barriers to participation in the offset system:

- A number of components of the costs of participation (project development, project validation, verification/certification of reductions/removals) are relatively fixed and independent of the size of the reduction/removals. These transactions costs can represent a significant proportion of the total value of a small offset project.
- SMEs are likely to lack knowledge of the system and lack capacity to address some of the requirements of the process. This may increase transaction costs relative to larger proponents.

Some of these barriers could be reduced by establishing separate requirements for small projects, as has been done for the Clean Development Mechanism. Options for streamlining the process for small projects include:

- highly standardized baselines and quantification methodologies;
- simplifying the information requirements for the project review;
- limiting or eliminating the project validation stage, i.e., automatic approval for certain types of activities, or a simple checklist approach to validation;
- no requirement to determine leakage;
- simplified monitoring and reporting requirements; and
- reduced requirements for verification.

Recommendation #9:

Develop mechanisms to complement actions that support adaptation.

Develop and implement mechanisms that can harness the emissions market to stimulate more adaptation activity than would otherwise take place and, therefore, reduce the public cost of adaptation. Such action should be taken at provincial and federal levels.

Globally, it is apparent that some adaptation to a changing climate will be required notwithstanding the possibility of stringent GHG reduction regimes in the future. And no amount of adaptation will be able to sustainably address climate change without some global mitigation commitments. At the local level, there is a growing body of literature which shows that many actions taken to help local communities adapt to climate variability also carry significant mitigation potential.

What types of projects benefit both mitigation and adaptation?

While there are currently no established criteria being used to define an adaptation project, here it makes sense to define an adaptation project as a project that builds resilience to the impacts of climate change (e.g., drought, flooding, ice storms, etc.).

An example of an existing initiative in Manitoba that would meet both the offset and adaptation criteria are the conservation programs of The Deerwood Soil and Water Management Association—a group of 150 local land owners who have integrated conservation practices into their farm management plans. Some of their practices are outlined in Table 3.

Table 3. Examples of projects at the mitigation-adaptation nexus.

Activity	Adaptation Benefit	Emissions Offset
Zero and minimum tillage	Reduced soil erosion, water quality improvement	Cropland management (via soil-carbon conservation)
Riparian zone management	Reduced soil erosion, flood control	Re-vegetation, soil-carbon conservation
Shelterbelt planting and maintenance	Reduced soil erosion	Re-vegetation, soil-carbon conservation
Wetlands habitat enhancement	Flood and drought buffering	Afforestation
Biomass and biofuel generation	Rural income diversification, soil-water conservation benefit if produced on degraded lands	Reduced emissions from fossil fuel use
Reclamation of degraded lands	Reduced soil erosion, flood control	Afforestation, re-vegetation

Background on climate change adaptation

In June 2003, the Standing Senate Committee on Agriculture and Forestry published an interim report entitled, *Climate Change: We Are at Risk*. This committee concluded that Canadian agriculture will be affected by climate change, and noted that more frequent and widespread drought on the Prairies is expected. It is an insight that has been shared in the media, as well.[17]

Prairie agriculture, for example, has had to continuously adapt to climate vagaries. Adaptations in the past have included out-migration during the dust-bowl of the 1930s. The Prairies produce well over half of the total value of Canadian agri-food exports, yet are still frequently affected by climate-related disasters. Between 1972 and 1992, Canadian federal government payments directly related to climate, such as drought assistance, crop loss compensation and crop insurance, totalled $5 billion. These economic impacts are expected to increase under climate change.

However, climate change researchers concede that the future climate remains unknown. Some climate models predict that the prairies will be wetter, while others predict dryer conditions. The general consensus is that the future climate will be more extreme; more intense floods and droughts will likely be the norm. Climate adaptation research has, therefore, shifted to the goal of building resilience to future climate stresses *in general*, and less on specific adaptation measures designed for a future climate that can not yet be predicted with any confidence. Resilience to climate change can be created by increasing the capacity to adapt to a range of future climates. This has social, economic and environmental dimensions.

Existing adaptation and mitigation programs in Canada and Manitoba

Several efforts are underway across Canada to help build capacity to adapt to future climate change. The Canadian Climate Impacts and Adaptation Research Network (C-CIARN[18]) is managed by Natural Resources Canada with a mandate to bring researchers together with decision-makers from industry, governments and non-government organizations to: (1) improve our knowledge of Canada's vulnerabilities to climate change; (2) identify ways to minimize the negative effects of future impacts; and (3) explore opportunities that take advantage of any positive impacts. The C-CIARN centre for the Prairies is the Prairie Adaptation Research Collaborative (PARC) at the University of Regina.

Industry-government-academic partnerships have also been formed to focus on adaptation. For example, the Ouranos Consortium in Quebec is a partnership among the Government of Québec, Hydro-Québec, the Meteorological Service of Canada and Valorisation-Recherche Québec with a mandate to "perform evaluations of expected sectoral impacts of climate change in order to optimize adaptation strategies."[19]

As a government policy example, consider Agriculture and Agri-Food Canada's new Agricultural Policy Framework (APF)—to which Manitoba is a recent signatory. The APF is designed to increase the resilience of the rural economy and the agricultural sector and is an important new policy initiative. Although climate change is not the focus of the APF, adaptation to climate change provides a practical context for integrating the various APF components, particularly Business Risk Management, Environmental Farm Planning and Rural Renewal.

Simultaneously on the mitigation side, the federal government is proposing to use forests, agricultural land, and biomass energy to meet over 50 megatonnes of CO_2 reductions.[20] AAFC is involved heavily in partnerships such as the Greenhouse Gas Mitigation Advisory Council, which is researching farm practices and technologies that generate GHG offsets from on-farm carbon sequestration and that are expected to generate economic and environmental co-benefits.

Despite the significant level of activity on both adaptation and mitigation, there is little integration of the two tracks in Canada or internationally, yet the overlap between mitigation and adaptation on the agricultural landscape in particular is obvious. For example, the Greenhouse Gas Mitigation Advisory Council is consulting with the Soil Conservation Council of Canada on soil conservation practices that will maximize carbon sequestration in agricultural soils. Soil conservation is also a fundamental climate adaptation strategy. The Prairie Farm Rehabilitation Administration original *raison d'etre* was to disseminate soil and water conservation practices to help farmers cope with the severe climate stress of the "Dirty '30s." Last year, farmers in Manitoba's Tobacco Creek watershed experienced dramatically reduced vulnerability to flooding compared to neighbouring watersheds because of the soil and water conservation practices that they have adopted.

The Climate Change Plan for Canada does provide the architecture for integrating mitigation and adaptation. However, it needs some focus to ensure that the co-benefit is realized. Greencover Canada is an initiative under the farm environmental planning framework of the new Agriculture Policy Framework and it is designed to promote sustainable land use and expand the area covered by perennial forage and trees. This initiative is included in Canada's Climate Change Plan to help deliver up to 5.8 megatonnes of CO_2 reductions. In addition, Canada's plan will establish a framework that will enable agricultural and forestry sinks and emissions reductions to be sold as offsets into the domestic emissions trading system. However, the latest articulation of the design of the offsets system does not acknowledge the mitigation-adaptation co-benefit and consequently, does not recommend any mechanisms to ensure that at least some offset credits are purchased from projects that have an adaptation benefit.

How could the benefits be realized?

It is a virtual certainty that Manitoba's private and public sectors and communities will incur costs in adapting to climate change. Manitoba could realize a benefit from offset projects that contribute to adap-

tation through several possible mechanisms. The underderlying logic is to harness the emissions market to stimulate more adaptation activity than would otherwise take place and to reduce the public cost of adaptation.

1. *Direct cost-sharing*

   A cost-sharing mechanism could be employed for offset projects that are demonstrated to contribute to adaptation, and where the adaptation benefits are desirable irrespective of the offset co-benefit.

   The cost-sharing approach creates a market incentive for emitters to purchase offset credits from adaptation projects; essentially the private entity reduces the public cost of the adaptation project, while the public sector reduces the emissions offset cost for the private entity.

   This approach would be feasible where the offset project contributes to an adaptation measure supported by government policy and local stakeholders. This would also represent a direct subsidy for a certain type of offset project, but, if done correctly, would reduce the total cost of climate change to the economy.

2. *Packaging adaptation initiatives so that they are attractive as offset projects*

   Mechanisms such as additional public recognition of offset purchases that support adaptation initiatives, and other outreach/communication programs could be considered.

Who could benefit?

The large final emitters (LFEs) that need to purchase offset will potentially benefit from the integration of adaptation into the emissions offset system, provided that the cost of the adaptation-mitigation offset purchase is shared with other stakeholders. The other benefiting stakeholders will be from the sectors that incur future adaptation costs.

The agriculture policy most directly associated with the integration of mitigation and adaptation is the new federal Agriculture Policy Framework (APF) to which Manitoba is a signatory. As stated previously, although climate change is not a focus of the new APF, adaptation to climate change does provide a practical context for integrating various components, particularly Business Risk Management, Environmental Farm Planning and Rural Renewal.

Other potential beneficiaries will be entities that need to undertake reclamation of degraded lands. They could include forestry companies, mining companies and municipal landfill operators.

Recommendation #10:

Promote Manitoban and Canadian technologies internationally.

Promote Manitoban and Canadian technologies via the Clean Development Mechanism, Joint Implementation and Russia's Green Investment Scheme.

The Clean Development Mechanism (CDM)[21]

The Kyoto Protocol commits industrialized countries to attaining legally binding greenhouse gas (GHG) emissions reduction targets during the period 2008–2012. Most GHG emissions are produced by private companies and individuals and countries are expected to achieve most of their emissions reductions at home. The Protocol contains three "flexibility mechanisms" that enable emitters to achieve their remaining reductions cost-effectively.

One of these mechanisms, the Clean Development Mechanism (CDM), provides a means for countries or companies to financially contribute towards GHG reduction measures—and a limited number of sequestration projects—in developing countries, provided these projects also result in sustainable development as defined by the host country, and are implemented in an environmentally benign manner.

In return for this investment, the investing company receives a "certified emission reduction" (CER) credit.

While a significant portion of Canada's committed GHG reductions would be achieved domestically, companies can offset their remaining emissions at lower cost by participating in domestic emissions trading in Canada, and by using the CDM.

The following organizations are involved in the implementation of a CDM project:

- *Project Proponent:* The entities such as a company or local NGO that develops and implements the CDM project.
- *CER Purchaser:* the company that invests in the project or purchases the CERs.
- *Host Country:* The developing country in which the CDM project is proposed to take place.
- *Executive Board:* Supervisory body of the CDM.
- *Operational Entity:* An independent legal entity designated to validate CDM activities and emissions reductions that is accredited and accountable to the Executive Board. Emission reductions will be compared against established baseline measures.

Each CDM project must follow a prescribed process to earn certified emissions reductions. Each of the following steps must be undertaken in cooperation with an independent party, known as an "Operational Entity":

1. *Validation:* The project design must be evaluated against the requirements of the CDM, as outlined in the Addendum of Article 12 of the Marrakech Accords.
2. *Registration:* The validated project must be formally accepted by the Executive Board.
3. *Verification:* The monitored reductions that occur as a result of the CDM project must be reviewed periodically.
4. *Certification:* A written assurance must be provided that the CDM project achieved the verified emissions reductions (CER).

Box 10. Example CDM projects.

Bangladesh

Vegetable cold storage cogeneration: Existing vapour compression refrigeration coolers will be partially replaced by a cogeneration scheme consisting of waste heat utilization by absorption refrigeration chillers. This project will consist of 8–10 units of 300 kW each with a total CO_2 mitigation potential of 3,000 tonnes per year.

Brick manufacturing efficiency: Efficient natural gas-burning Hoffmann kilns will be used to replace coal-burning crude technology Bull Trench kilns. This project will consist of 10 to 100 new Hoffmann kilns providing a total CO_2 mitigation potential of approximately 50,000 tonnes per year.

Indonesia

Palm oil waste power generation: This power plant will use a specially designed high pressure boiler and steam turbo-generator to generate 10.3 MW electricity from six palm oil waste electricity plants. The "empty fruit bunch" waste is a technically challenging fuel due to its high moisture content, fibrous nature and ash to slag ratio.

Micro-hydro power generation: This project will consist of a group of micro-hydro units to supply the grid and displace fossil fuel generation.

Joint Implementation (JI) Mechanism

Joint Implementation (JI) provides industry, non-governmental organizations, and all levels of governments the opportunity to invest in emission reduction/sequestration reduction opportunities in other countries who have taken on emission reduction commitments. Likely countries that would host reduction projects are Economies in Transition in Central and Eastern Europe and the Former Soviet Union.

Benefits of using the JI mechanisms include:

- a cost-effective way to reduce emissions;
- generation of emission reduction units (ERUs);
- access to new markets and investment opportunities; and
- opportunity to raise corporate profile locally and internationally.

JI allows Canada to implement emission-reduction projects in cooperation with other Annex 1 parties. Emission reduction units (ERU) are generated from JI projects, which can be applied to the investing Party's emission targets. There are two types of procedures for executing a joint implementation project: Track 1 and Track 2.

JI allows Canadian organizations and enterprises the flexibility to reduce GHG emissions in a cost-effective manner. Any entities participating would need to be registered with Canada's CDM/JI office. JI projects are most likely to take place in host countries where the economies are in transition, as this will lower costs.

To participate in Joint Implementation, a country must:

- be a Party to the Kyoto Protocol;
- be in compliance with a minimum set of methodological and reporting requirements;
- have established an assigned amount;
- have a national system in place that estimates emission sources;
- establish a national emissions registry;
- annually submit an updated emissions inventory; and
- submit supplementary information on the assigned amount.

2008 is too late!

Box 11. The benefits of early action in meeting the Kyoto target in the EU.

A 2002 article prepared by Shell for the Parliament Magazine in Europe discussed the benefits of early action in meeting the Kyoto target in the EU. The article states the following:

Agreement on the European Emissions Trading Directive will be an important step, but in itself will not mean that Europe now has an easy path forward to meet its Kyoto obligations. There is still much to do and the time in which to do it is very limited.

Understanding the Kyoto obligation

The emissions reduction target that Europe has been set by the Kyoto Protocol is not simply some number to be reached by 2010 or 2012. Rather, the Kyoto clock starts ticking on January 1, 2008, just four years away. For Europe, Kyoto limits the average yearly emissions in the period January 2008 through December 2012 to eight per cent less than 1990 emissions.

Figure 3. Target 8% reduction.

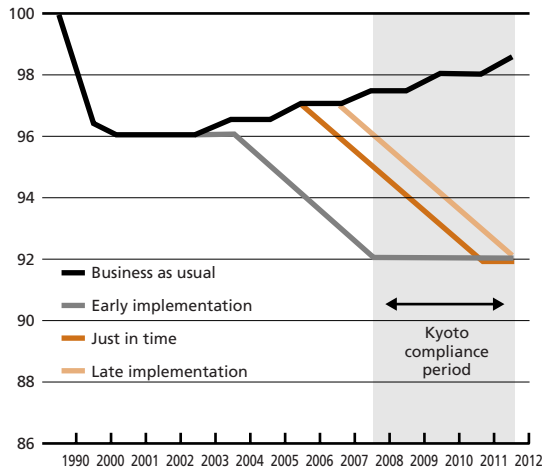
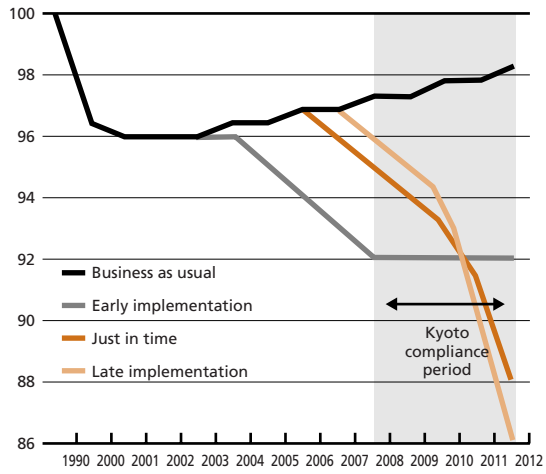


Figure 4. Target 8% 5-year average reduction.



What does this mean for Europe's reduction strategy?

Figure 3 shows three reduction paths that Europe might travel along to achieve an eight per cent reduction.[22] Option 1 (Early Implementation), which sees significant early action by industry and others, has much of the necessary reduction achieved before 2008. In this case, the 2008–2012 five-year average is 92 per cent. Option 2 (Just in Time) sees real reductions starting as we approach 2008, but not complete until end 2010—the five-year average is now 93 per cent. Finally, option 3 (Late Implementation) sees reduction timed to finish by 2012, with a five-year average of 94 per cent. Although all three options reduce emissions by eight per cent by 2012, only option 1 actually meets the Kyoto target of an average eight per cent between 2008 and 2012.

This means that paths 2 and 3 need to see additional reductions made during the five year period to pull the average back on target. This is illustrated in Figure 4. All three paths now meet the five-year Kyoto target, but clearly paths 2 and 3 must dig very deep to do so. These additional reductions would not only be more costly to implement, but in practice may not be achievable in the short time shown and Europe would then miss the target.

> The Emissions Trading Directive will be a major step forward, but clear encouragement is needed for action in the period 2005 to 2007. For real reductions to be made by industry during this period, planning will have to start in 2003. This means industry needs early clarity not just on the rules governing the system, but on the allocation of emission allowances as well. The formulation and communication of national allocation plans needs to start now.

Source: The Parliament Magazine, Issue 148, October 2002, p. 28.

Recommendation #11:

Propose to the federal government to start the domestic emissions trading system early by setting targets for 2006–2007.

Propose to the federal government to start the Canadian domestic emissions trading system early by setting targets for LFEs beginning in 2006. Consider allowing LFEs to bank allowances/credits into the 2008–2012 period.

Other jurisdictions are starting their GHG emission trading systems early—most notably the European Union. The EU has agreed to implement an EU-wide greenhouse gas emission trading system (EU ETS) that is scheduled to come into effect in January 2005. If implemented as expected, the EU ETS will be the largest emission trading system in the world and the first multinational system. The system will be implemented in two phases: Phase 1 implements a carbon dioxide cap and trade system for the period 2005–2007; Phase 2 will address the first Kyoto commitment period. Estimates made on behalf of the European Commission suggest that the proposed ETS will reduce total abatement costs by some 24 per cent, leading to cost savings of some €2.1 billion/year by 2010.[23]

Allowances can be banked across years during Phase 1. EU Member States must decide whether or not to allow banking into Phase 2 (2008–2012). The EU ETS includes significant penalties for non-compliance. Excess tonnes will be penalized at €40/tonne of CO_2 in the initial period 2005–2007, rising to €100/tonne in 2008.

Although the trading system does not start until January 2005, forward trades of EU allowances are already taking place. Evolution Markets LLC reports that it facilitated a forward trade of EU Allowances, involving a total volume of 90,000 EUAs split between 2005, 2006 and 2007 vintages from a seller in Central Europe. The average price was €9/EUA with partial down payment.[24]

Starting the Canadian system prior to 2008 would be difficult, but may be possible. Most of the details of Canada's domestic emissions trading and offset system have been conceptualized in appreciable detail. The remaining detail to work out now involves the administrative requirements of the system such as registry and verification, and this work is underway. Additionally, public consultations on the Offset System Discussion paper have been completed for the most part and a revised draft of the system is due out likely early in 2004.

The primary barrier to starting a domestic system early in Canada is passing the legislation associated with the system. Given the recent changes in Ottawa, it is not likely that any emissions trading legislation will be passed in 2004.

It may be possible to start the Canadian system in 2006. This would provide two years of valuable experience with emission trading in Canada, and some real incentives for LFEs to begin reducing emissions. It would also be possible to start the offset system at the same time.

A significant question would be whether to allow LFEs (and other entities) to bank allowances and credits from the 2005–2007 period into the Kyoto commitment period, and to allow them to be exchanged for Kyoto compliance units. Because the banked allowances are not associated with reductions in the

2008–2012 period, they would need to be compensated for by additional reductions in the Kyoto commitment period or by additional purchases of international credits.

The opportunity to bank allowances and credits into the Kyoto period will be an important incentive for LFEs and other entities, and may be required in order to reach agreement on an early start to the system. A proposal that involved an early start to the system, with banking into 2008–2012, was made by a group of industry and environmental groups several years ago, but was not accepted by the federal and provincial governments.

One possibility is to allow banking, but with a discount applied to early reductions. This would still provide a significant incentive, but would reduce the impact on Kyoto period costs (in terms of the need to purchase additional international credits).

Recommendation #12:

Ensure that the federal government provides fair treatment and recognition of large final emitters (LFEs) and offset-eligible investments pursued in the 1990s.

- Manitoba should recommend that the federal government set intensity targets for large final emitters to reflect the early emission reduction actions taken since 1990 by some sectors, such as pulp and paper. This is consistent with the commitment by federal/provincial/territorial energy and environment ministers that early actors would not be penalized by the design of the emissions trading system.
- The design of the offset system should ensure that there are no incentives to reverse existing removals, for example, by setting a project eligibility start-date of 1998 for activities that enhance agricultural soil sinks.

The design of the emission trading system can have four different kinds of implications for early action. The system could:

- reward entities that took action early (since 1990) by providing credits that could be banked into commitment period. The federal discussion paper on offsets notes that treatment of actions under GERT, PERT is under consideration;
- provide additional incentive for new actions to reduce emissions in the form of credits that could be banked into the Kyoto commitment period;
- avoid (or create) perverse incentives, for example, to reverse removals; and
- avoid (or create) disincentives for actions that entities would otherwise take to reduce emissions prior to 2008.

The main policy considerations are efficiency (cost-effectiveness) and equity:

- does treatment for early action increase (or reduce) the overall costs to Canada of meeting the Kyoto target?
- does treatment for early action increase fairness in the system?

Cost and efficiency considerations are particularly important factors for the offset system. Domestic offsets do not help Canada meet its Kyoto commitment; rather they provide another compliance option for LFEs. Policy options that increase the supply of offset credits will generally require that Canada purchase more international credits.[25]

The policy considerations are different for LFEs and offsets.

Large final emitters

The backstop/covenant system proposed by the federal government would allocate allowances to LFEs in each year of the commitment period equal to the LFE's production multiplied by a sector intensity or allocation factor.

This approach provides some incentive for early action once the allocation factor is set, since any actions that reduce a firm's emission intensity will create surplus allowances (or reduce the firm's shortfall) in the Kyoto commitment period. Also, this approach does not create any perverse incentives (i.e., to increase emissions prior to 2008 in order to receive a large allocation), since allocation is independent of the individual firm's emission intensity.

Although the system provides some incentive for new reductions, it may also be viewed as penalizing sectors that have acted early, depending on how the sector allocation factor is set. For example, if the target intensity factor in each sector is set at 85 per cent of current (or projected 2010 BAU) emission intensity, then sectors that have reduced emission intensity since 1990 will receive fewer allowances than if they had not taken early action (or had increased emission intensity). Although there are many factors that affect the "fairness" of allocation across and within sectors (including differences in emission reduction opportunities and costs), sectors that have reduced emissions intensity since 1990, such as the pulp and paper industry, argue that these actions should be reflected in their target. The federal government has acknowledged this issue and the need to take early action into account in setting intensity targets. The challenge will be to accommodate early action without compromising the 55 megatonne reduction target for LFEs, which can only be reached if the average intensity target across all LFEs is 85 per cent of projected intensity in 2010.

Setting sector intensity targets to reflect early action would be consistent with the federal/provincial/territorial Baseline Protection Initiative, and the agreement by F/P/T Energy and Environment Ministers that early actors would not be penalized by the design of the emission trading system.

The proposed system would not provide credits for pre-2008 reductions that could be banked into the Kyoto Commitment period. Federal/provincial/territorial energy and environment ministers committed in 1998 to create such a system, and established the Credit for Early Action Issue Table to evaluate options. However, the federal government was unwilling to accept the increased liability associated with an early crediting system, and ultimately Joint Ministers were only able to agree to provide baseline protection.

Offsets system

If the project eligibility start-date for offset credits is later than 1990, activities started before that date would be ineligible even though they will contribute to Canada's target provided they are maintained through 2012. For example, farmers would have an incentive to till their land so that the later re-introduction of low-till would create offset credits. This kind of perverse incentive can be avoided by setting a start-date of 1998 for activities such as agricultural soil sequestration that can be easily reversed.

In analyzing credit for early action it is important to understand the dilemma faced by government in the design of the offset system. On the one hand, the government wants to find ways of helping LFEs meet their 55 megatonne emission reduction target. On the other hand, domestic offsets do not help Canada meet its Kyoto commitment (i.e., they do not reduce overall emissions); rather they provide another compliance option for LFEs. Increasing the supply of offset credits, for example by allowing credits for pre-2008 reductions, will increase the burden on the government and other sectors to find reductions elsewhere or buy additional international credits.

Recommendation #13:

Create sufficient incentive for emission reductions and removals prior to 2008.

- Manitoba should recommend to the federal government that it should identify how many credits might actually be claimed under an early offsets program, and should evaluate the effectiveness and cost of providing offset credits for pre-2008 reductions/removals where doing so is likely to accelerate and/or increase reductions/removals in the Kyoto period.
- At a minimum, the federal government should set a project eligibility start date of no later than 2003 (for projects other than agricultural soil sinks where the start date should be set at 1998 to eliminate perverse incentives) in order to provide some incentive for pre-2008 investments in offsets.
- The federal government should also be encouraged to introduce other programs and incentives for early action, such as an expanded Pilot Emission Removals, Reductions and Learnings Initiative (PERRL) program.
- The Manitoba government could contribute to an expanded PERRL-like program in Manitoba.

The offset system can provide incentives for new actions through the choice of start-date and the crediting period. The federal government has requested input on the choice of project eligibility start-date, but has indicated that credits would only be provided for the reductions/removals that occur during the five-year Kyoto crediting period. For example, a project eligibility start date of 2003 would provide some incentive for activities prior to 2008, even though credits could only be earned for reductions/removals during the 2008–2012 period.

The issuance of credits for pre-2008 reductions/removals will require that the federal government purchase additional international credits to cover the shortfall, since the offset credits do not correspond to incremental reductions/removals in the 2008–2012 period. While this approach may provide an incentive to accelerate reductions, it should also be evaluated against other alternatives and programs, such as the possible expansion of the federal government's PERRL program, which purchases emission reductions in the pre-2008 period (see Box 12).

An additional mechanism is for Manitoba to devote some of its own resources to buying offsets from Manitoba producers. This would be justified in four ways:

1. it would repay Manitoba to develop a set of definitions and rules for offsets, in order to contribute Manitoba-friendly input to the federal process, in an area where Manitoba has a long-term economic interest;
2. it would introduce Manitoba offset producers to the concepts and operations of a trading system, giving them an important leg up when the national system starts running;
3. the intermediate institutions, such as pooling organizations, could begin operating, again developing a better base in Manitoba; and
4. emphasis could be put on developing trading systems that have a Manitoba base.

Box 12. Programs currently providing incentive for early action.

There are a number of mechanisms in place outside of the proposed emissions trading system that provide financial incentive for early action. Some of these mechanisms are summarized below.

Pilot Emissions Removals, Reductions and Learnings (PERRL) Initiative. Started in the fall of 2002, this initiative will provide $13.2 million to purchase emissions reductions and removals from eligible projects from now till 2007. The four strategic sectors eligible to participate include landfill gas capture and storage, CO_2 capture and geologic storage, renewable energy, and biological sinks. PERRL is a pilot program and although it appears to be a cost-effective mechanism, the continuation of this program beyond the fall of 2003 is in question given that the upcoming offsets system will provide incentives for projects in these areas. It is interesting to note that if this program is not extended beyond the fall of 2003, there will be a period of four years from 2004 to 2008 where such an incentive mechanism will not exist.

Greencover Canada Initiative. This program delivers $110 million in financial incentives over a five-year period to help agriculture producers convert environmentally-sensitive land to perennial cover, manage agricultural land near water, adopt beneficial management practices; and plant trees on agricultural land.[26] At this time, only projects contributing to converting environmentally-sensitive lands to perennial cover are being funded.

Opportunities Envelope. $160 million has been set aside in 2003–04 to allow the federal government to contribute to cost-effective emissions reduction initiatives proposed by the provinces and territories.[27] This Opportunities Envelope initiative appears to be focused on emissions reduction and not on carbon sequestration projects.

Aboriginal and Northern Community Action Program (ANCAP). This program makes available $30.7 million to support the approximately 130 northern communities reliant on diesel imports to develop alternative energy sources and improve energy efficiency.[28] In doing so, this program has the potential to support projects at the mitigation-adaptation nexus.[29]

Recommendation #14:

Work to develop a long-term open emissions trading market in which Manitoba offset producers can trade.

The provincial government should work to develop a long-term open market in which Manitoba producers can trade.

The task force had presentations from three different trading groups, each of which had particular strengths for helping Manitoba supply its offsets to emissions trading systems. The first was the Winnipeg Commodity Exchange, and its proposed Canadian Climate Exchange which were discussed earlier. This group would provide a locally-based trading opportunity.

The second was the now active Chicago Climate Exchange (CCX), which is learning by doing in a voluntary emissions trading market. The CCX is a "self-regulatory exchange that administers the world's first multi-national and multi-sector marketplace for reducing and trading greenhouse gas emissions."[30] The experience of the CCX is that there are many questions that can only be identified and answered by actually implementing a program. They believe that for this reason, it is unwise to wait until 2008 to get hands-on experience in emissions trading.[31]

The Chicago Climate Exchange is a voluntary, private pilot program for trading Kyoto greenhouse gases throughout the U.S. Under the scheme's cap-and-trade rules, the overall allocation of permits is reduced

by one per cent a year relative to a 1998–2001 baseline. Trading between participating firms (including Manitoba Hydro) began in the fall of 2003.

As well as reducing emissions at source, participants are encouraged to purchase emission offsets from carbon sequestration projects in Brazil. In 2005, the organizers hope to extend membership to overseas industries as well as the U.S. Participants in CCX include Manitoba Hydro, Ford Motor Company, Dupont, the City of Chicago, Motorola and Stora Enso.

Box 13. The Chicago Climate Exchange (CCX) is up and running, and learning.

The objectives of the CCX are well suited to the complex world of emissions trading. Their objectives are:

- proof of concept of cap-and-trade, and offsets;
- develop market infrastructure and skills: build institutions needed for the long-term;
- price discovery;
- predictable GHG reduction schedule, flexibility; and
- start small, evolve to international linkages.

The third presentation was from Forexster, a company run by a Winnipeg entrepreneur who has developed a successful foreign exchange trading system, and has now extended its approach to the trading of GHG credits. Forexster facilitates matching of natural buyers with natural sellers as if the instrument was traded on a central exchange, without a need for a central exchange. Forexster gives all participants the choice of whether to be a price-maker or a price-taker. As a result, it should be easy for small players to join the market, increasing liquidity in the early stages of development.

An application of this system to emissions trading would be fully decentralized, not focused on a specific location. In this, it would be more akin to the trading regime for foreign exchange, rather than stock exchanges of commodity markets.

Box 14. Forexster's decentralized, Web-based emissions trading system.

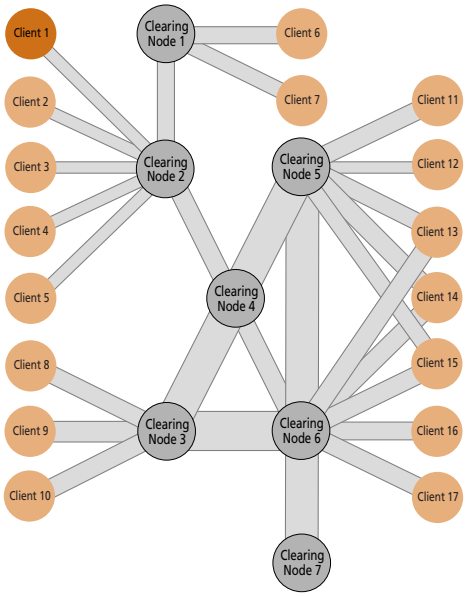
Trading emission credits is structurally no different from the trading of foreign exchange. In order for trading of emission credits to work most effectively it shall require an efficient mechanism across which all participants may purchase or sell excess credits from each other from time to time, on a global basis, without unnecessary counterparty risks.

The Forexster system would trade emission credits at the lowest possible cost to buyers and sellers, achieving maximum transparency and ensuring a minimum of "noise" from—and revenue extracted by—middle-men. Network architecture enables direct dealing between parties at natural buyer/natural seller spreads for a particular instrument, as if the instrument were traded directly on a central exchange, but without the need for a central exchange. By providing the most efficient dealing mechanism, Forexster operates at the lowest cost to market participants.

To enable the most efficient mode of exchange, Forexster's network dealing architecture seamlessly links each dealing facility, world-wide, expanding the pool of supply and demand without unnecessary brokerage fees thus lowering spreads and providing a lower cost of trading for all participants, world-wide.

A "network of credit" is shown in Figure 5. Lines of credit are extended from clearing nodes—which may be banks or other financial institutions, insurance companies, clearing

Figure 5. The Forexster system.



houses, local exchanges or government-sponsored purpose-specific agencies—to "clients," i.e., "sources," "sinks," other market makers, speculators and related entities.

Each clearing node is responsible for setting credit limits between itself and other clearing nodes, and between itself and its clients.

Forexster is able to match bids and offers across a network of implicit lines of credit and to monitor and ensure that no entity is able to deal beyond its credit limit; and to ensure that deals made across such lines are communicated to the back office of each clearing node in the "credit path" between an ultimate buyer/seller pair.

Other emissions trading schemes

Several emissions trading schemes are already under way. For example, the first economy-wide greenhouse gas trading system was launched in the United Kingdom on April 2, 2002. The program was not designed to be a Kyoto-type emissions trading scheme, but rather was a means of testing some of the principles of trading in a real-world setting. In effect, the U.K. government has set aside a fixed sum of money for "buying" greenhouse gas emissions and subsequently "retiring" (eliminating) them. To ensure the maximum return on its money, the funds were allocated to companies that submitted the highest bids, in terms of emission reduction pledges, at an auction held in January 2002. The baseline for emission reductions is the three-year period 1998–2000 (http://www.defra.gov.uk/environment/climatechange/trading/index.htm).

The European Union has recently agreed to establish an emissions trading regime. This is in the context of the EU's overall greenhouse gas reduction target of eight per cent below 1990 levels by 2008–2012, and an internal allocation of that target agreed to by member states. Some states will be allowed to increase their emissions, while others have been given demanding targets for reductions.

The regime will be phased in, with an introductory operating period from 2005 to the end of 2007. During that time permits will be allocated free of charge, and penalties for non-compliance will be rela-

tively modest. Starting at the beginning of 2008, when the Protocol's first commitment period begins, the regime will become more rigorous (http://europa.eu.int/comm/environment/climat/emission.htm).

Like Shell, the energy company BP has been experimenting with an internal greenhouse gas emissions trading program for its various divisions. The company has set itself the target of a 10 per cent cut in emissions, relative to 1998, and an emissions cap is lowered each year towards this goal. Trading began in January 2000. Participants are entitled to bank their unused permits, but only up to a limit of five per cent of their initial allocation—a restriction that was put in place to encourage trading. The average price per trade has been in the region US$7–8.

The Ontario Emission Trading Program has been under way in Ontario since January 2002. The scheme at present is limited to nitrogen oxides (NO_x) and sulphur dioxide (SO_2), because its purpose is to curb smog and acid rain from power stations. However, the provincial government is hoping to extend the scheme to a wide range of large final emitters.

A significant element in the Ontario program is the ability to trade emission credits across national borders, in this case with 12 U.S. states whose industrial emissions are carried into Ontario by the prevailing wind and exacerbate air pollution in the province.

Ontario's program has been termed "cap, credit and trade." As well as the conventional cap-and-trade arrangement, it allows participants to purchase emission credits from a wide variety of organizations, including those under other jurisdictions where there is no emission cap, such as U.S. states (http://www.ene.gov.on.ca/envision/air/etr/index.htm).

We need to get the trading system right in the long run

Recommendation #15:

Seek the participation of the United States in emissions trading.

- The Manitoba government should explore opportunities for cross-border trading with emerging trading systems within the United States in effort to explore potential demand for GHG offsets and to encourage U.S. participation in GHG reductions and removals.
- The Manitoba government should encourage our federal government to ensure that future international agreements to limit greenhouse gas emissions involve U.S. participation on a basis that is equitable for Canada.

The United States is responsible for 25 per cent of global greenhouse gas emissions, and in the long term must play a key role in international efforts to limit GHG emissions. The Bush Administration has rejected the Kyoto Protocol, consequently the U.S. will remain outside the Kyoto framework until at least 2013. This has significant economic consequences for Canada and Canadian corporations, because of the close links between the two economies.

A major focus of Canada's climate change policy has been to compensate for the absence of the U.S. and ensure that the ability of Canadian firms to compete in North American markets is not adversely affected by emission constraints. This has resulted in the adoption of an emission intensity approach and a price cap, elements of the LFE backstop/covenant system that limit cost impacts on LFEs, but in the long term also limit the effectiveness of the emission trading system.

As long as the U.S. stays outside of the Kyoto Protocol, it will be very difficult to establish direct linkages between U.S. emission trading systems and Canada's LFE emission trading system. The tradable units in the Canadian system are effectively Kyoto compliance units; however, the tradable units from U.S. systems can not be used for compliance with Kyoto requirements.

Future agreements to limit emissions will need to be consistent with the growing integration of the North American economies. As the only member of NAFTA with emission targets under Kyoto, Canada is in a position to take a leadership role in helping to develop an international agreement that includes the U.S. There are many possible options, and the international climate regime following Kyoto may in fact include a variety of regional and sectoral approaches rather than a single international agreement.

One possible approach for North America may be a regional NAFTA target that is limited initially to the electric power sector. This would address the main industry sources in the U.S. and would build on past U.S. experience with cap-and-trade systems for SO_2. It would also build on the activism of state governments in the U.S., which have introduced a number of regulatory measures while the Bush Administration has emphasized a voluntary approach to limiting greenhouse gas emissions.

A number of states have recently introduced carbon dioxide caps and emission trading systems for the electric power sector. In 1997, Oregon introduced the first mandatory limit on CO_2 emissions. In 2001, Massachusetts was the first state to introduce a multi-pollutant standard that included CO_2, followed closely by New Hampshire in 2002. New York is currently leading an initiative among 10 northeastern states towards a regional cap and trade system for CO_2 emissions from the power sector. In the Pacific Northwest, Oregon's approach has been adopted by Washington, where a CO_2 standard for power plants is under development.

While the federal government needs to take the lead on the development of a post-Kyoto regime, Manitoba can also play an important role by participating in cross-border initiatives that encourage greater participation by the U.S.

As discussed in earlier sections, Manitoba could participate in the Chicago Climate Exchange to enhance its expertise and capacity in the area of offsets and other elements of the trading system.

Manitoba could also take a lead role in exploring options for regional cooperation between provinces and states, perhaps along the lines of the agreement on a Climate Change Action Plan by New England Governors and Eastern Canadian Premiers (NEG/ECP) in August 2001. While the Action Plan is not a formal agreement, and individual emission targets are not assigned to states and provinces, a number of states have begun developing action plans to meet the NEG/ECP targets and/or have introduced caps on the power sector consistent with the targets.

The Action Plan includes near-term and long-term goals. The short-term goal is the reduction of greenhouse gas emissions to 1990 levels by 2010. The mid-term goal is to reduce emissions by at least 10 per cent below 1990 levels by 2020. Finally, the long-term goal is to reduce emissions "sufficiently to eliminate any dangerous threat to the climate." NEG/ECP anticipates that the long-term goal will require emission reductions 75–85 per cent below current levels. The Plan also sets out a number of specific actions, including commitments to:

1. establish a standardized regional greenhouse gas emissions inventory;
2. establish a plan for reducing greenhouse gas emissions and conserving energy;
3. promote public awareness;
4. reduce public sector greenhouse gas emissions by 25 per cent by 2012;
5. reduce electricity sector CO_2 emissions per MWh produced by 20 per cent by 2025;
6. increase total energy saved by 20 per cent by 2025;
7. reduce and/or adapt to negative impacts of climate change;
8. reduce growth in transportation sector greenhouse gas emissions; and
9. create a regional greenhouse gas emissions registry and explore regional trading.

Recommendation #16:

Expand the coverage of the emissions trading system.

The Manitoba government should work to ensure that the future emissions trading system is as broad as possible—the system should include all sectors and sources for which it is practical, feasible and cost-effective to measure, monitor and report emissions.

from large final emitters, and would cover about 40 per cent of total Canadian emissions. While the inclusion of an offset system allows more sources and reductions to be brought into the system, the offset approach:

- is more costly in terms of administration, since each reduction must be approved separately; and
- does not reduce overall emissions, since offset credits created by projects are used by LFEs to increase their allowable emissions.

Broadening the coverage of the emission trading system would provide a common price signal to a much larger number of sources. This potentially lowers the cost of meeting Canada's emissions target by including more potential emission reductions within the system. Expanding the coverage of the emissions cap may also make it more likely that Canada will meet its emissions target, since a larger proportion of national emissions would be capped.

In principle, an emission trading system that covered 100 per cent of Canada's GHG emissions would minimize the overall costs of meeting an emission target like Kyoto, since it would ensure that all sources faced a common price and incentive for emission reductions. The main impediment to universal coverage is the feasibility and practicality of including sources in the emission trading system. Inclusion in the system requires that it be feasible and reasonably inexpensive to accurately measure, monitor and report emissions from a source.

The Tradable Permits Working Group (TPWG), one of the issue tables established through the national climate change process, assessed the practicality of monitoring methods for the six greenhouse gases and their main sources.[32] The TPWG identified four general categories of emissions:

1. Emissions that can be accurately estimated on the basis of the use of a substance that results in GHG emissions. The main example of this is CO_2 emissions from the combustion of fossil fuels.
2. Emissions that can be accurately estimated, for a given process technology, on the basis of measurement of the volume of substances used or product produced. Examples of these emissions include CO_2 emissions resulting from manufacturing processes, such as the production of cement or lime.
3. Emissions for which accurate estimation is only possible through direct monitoring of the emissions. Examples include methane and nitrous oxide emissions from large, stationary combustion sources.
4. Emissions for which there is no practical monitoring method, but that can be estimated in aggregate from the overall level and nature of activities with which the emissions are associated. Examples include N_2O emissions from vehicle engines and from fertiliser use, and methane emissions from livestock and from landfills.

The first two categories of emissions are the most practical to measure and monitor, while the emissions in the last category would be quite difficult to include in a cap and trade system. The TPWG concluded

that it would be feasible to include virtually all combustion and process-related CO_2 emissions, along with some other emissions that would be practical to measure and monitor, in an emission trading system. This "broad-as-practical" system would capture close to 80 per cent of total Canadian GHG emissions.

A system that included all combustion CO_2 emissions would include millions of small emission sources—vehicles, equipment, households and other buildings. While emissions from these sources can be measured accurately based on fuel usage, it would be expensive and impractical to require households and vehicle owners to hold emission permits to cover their very small emissions. The TPWG concluded that the same price incentive for emission reductions could be provided to small emitters by a system that required fossil fuel producers and suppliers to hold permits for the carbon content of their fuels. The price of these permits would then be reflected in the price of fuels to end-users and would provide the same incentive for emission reductions as if they had been required to hold permits directly.

The "broad-as-practical" approach has been given serious consideration in Canada, and the economic analysis of this approach confirms the general view that broader coverage would reduce overall costs. The federal government presented four implementation options for Canada to a series of stakeholder sessions in the summer of 2002, prior to the decision to ratify the Kyoto Protocol. One of the options presented was the "broad-as-practical" approach, and the economic analysis that was presented to stakeholders suggested that it was the least costly of the options that achieved the target.[33]

The "broad-as-practical" approach would require that upstream fossil fuel suppliers hold permits for the carbon content of fuels sold to domestic consumers. Because this approach has the effect of raising the retail price of fossil fuels, it could result in a significant windfall gain to fossil fuel suppliers if allowances were allocated free to suppliers. For this reason, the federal government should consider auctioning at least some of the permits provided to upstream fossil fuel suppliers in a broad-as-practical system.

In addition to lowering the overall costs of meeting Canada's emission target, an approach that included close to 80 per cent of emissions within a cap would make it more likely that Canada's target would be reached, since emitters of almost all emissions would not be able to exceed the cap without purchasing additional international permits. An emissions cap is more likely to achieve a given target than other approaches that provide financial incentives or disincentives.

Recommendation #17:

Begin discussions on appropriate provisions affecting investments for the long-term system.

Manitoba should play a leadership role by beginning dialogue with the federal government and other stakeholders on developing appropriate provisions affecting investments for the long-term trading system.

Task force members discussed the post-2012 emissions trading system and believed it important to begin serious discussions to design the most effective and productive formula. A majority of members believed that a trading system should allow for clear market signals and that this would require absolute emissions targets instead of intensity-based targets, an uncapped price of carbon, and a move toward auctioning a significant portion of allowances in future commitment periods.

Two task force members, Bob Puchniak and Kerry Hawkins, did not support these modifications to the investment provisions which, in their current form, provide certainty for future investments in energy projects.

The following explores the three investment-related issues: (1) absolute and intensity-based targets; (2) removing the domestic cap on the price of carbon; and (3) auctioning of allowances.

1. Absolute and intensity-based targets

Canada's Kyoto target is an absolute target—six per cent below 1990 levels by 2008–2012. It is probable that future international targets will be absolute as well. These targets may require reductions in emissions in Canada that can only be achieved through significant changes in technologies, processes and industry structure. The design of the emission trading system—and the choice of absolute rather than intensity targets—can have an important impact on new investment decisions, technology choices and research directions.

There can be important economic benefits from an intensity target. Because of the withdrawal of the United States from the Kyoto Protocol, firms in the U.S. will not face increased costs from emission limits. A Canadian emission trading system with absolute targets might reduce the competitiveness of some Canadian industry and provide an incentive to shift production to the United States. The intensity-based targets proposed by the federal government are intended to limit the impact on the competitiveness of Canadian industry since they significantly reduce the incentive to cut output and/or shift production capacity to the U.S.

This is particularly important when long-term, large investment decisions are being made. An intensity-based system allows for growth in the output of a company, without increasing its emission costs, providing a long-term opportunity for growth.

While there are good reasons in the short run—including the absence of the United States—to use intensity targets, in the long term Canada will likely need to make significant shifts in technologies, processes and industry structure in order to reduce greenhouse gas emissions. In the long term there will be many new investment decisions made and many shifts in production mix and industry structure, and the emission trading system can play a key role in providing an incentive for investments in low-GHG technologies, products and services. It will be particularly important to ensure that the emission trading system provides the same price incentive for all emission reductions—by setting absolute not relative targets—so that the overall cost of meeting the national target is minimized.

Intensity targets affect the price incentive provided by an emission trading system because they provide a production subsidy. Each unit of increased output results in an increase in the number of allowances allocated to the firm. This subsidy to output reduces the incentive to shut down emissions-intensive production, even if the cost of doing so would be less than other emission reduction options. The subsidy also reduces the incentive to shift the product mix and industry structure towards less GHG-intensive products and services. An intensity target distorts the price signal from an emission trading system because all emission reduction opportunities in the economy do not face the same price—and as a result an intensity target will not minimize the overall cost of meeting an absolute emission target, like Kyoto.

Industry targets that are disaggregated—i.e., that set different intensity targets for different products or processes—can reduce the incentive for cleaner technologies significantly. The electricity sector is a particularly important example. Electricity generation technologies differ significantly in terms of emissions, and a single average intensity factor for all electricity generation would provide windfall gains to existing hydro-electric facilities and significant penalties for existing coal plants. However, different intensity targets for coal, gas and new non-emitting sources would mean that there would be very little incentive to choose low-emitting technologies to meet new supply needs. The need to provide stronger incentives for new low-emitting investments can be balanced with the need to avoid penalizing existing investments (and/or seeing production shift to the U.S.) by setting differentiated intensity factors for existing capacity and an average or aggregated intensity factor for new production. However, the system still provides no incentive for reduced demand or investments in energy efficiency by electricity consumers.

2. Removing the domestic cap on the price of carbon

The federal government has committed to make allowances available to domestic industry at no more than $15/tonne during the Kyoto commitment period. This commitment is intended to limit the potential economic and financial impact on large emitters by ensuring that they are not at risk from high or fluctuating international permit prices. Although the commitment was made to the oil and gas industry (the Canadian Association of Petroleum Producers), it is expected to apply more broadly.

This commitment effectively caps the domestic price of carbon at $15/tonne CO_2e, since if allowances are available from the federal government for $15/tonne, no large emitter will pay more than $15/tonne for offsets or surplus allowances from other sellers.

In the absence of international emission trading, a price cap allows a country to manage the cost risk of meeting an emission reduction target. This approach has been recommended by a number of authors and organizations, including Resources for the Future, as an appropriate domestic strategy when the costs of emission reductions are highly uncertain.[34] From the viewpoint of an investor in a large project, the increased certainty of a capped price can be important, because it allows a worst case scenario of carbon costs to be calculated. This can be important in reaching investment decisions.

However, serious distortions can occur if a domestic price cap is combined with international emission trading. If the international price rises above $15/tonne, then no domestic emitters will purchase international compliance units. The federal government will be the sole buyer of international permits, and will be forced to cover the difference between the international price and the domestic cap on any purchases of additional domestic compliance units by Canadian emitters.

The federal government has not said how it will deliver on this commitment, but has indicated that it will release a discussion paper on the topic. It is likely that it will be difficult to manage the price cap without introducing constraints on international emission trading. This is because if the international price rises above the cap there will be a strong incentive for market participants to purchase domestic units at the capped price, and then to exchange them for international units that can be sold for a higher price.

The cost of the cap to Canada is uncertain. Because of the withdrawal of the U.S., most economic analyses suggest that the price of international permits will be quite low—less than US$5/tonne. However, there are a number of factors, including the behaviour of potential sellers such as Russia and the Ukraine, which could cause prices to be considerably higher, at least temporarily.

While the cap limits the financial exposure of the LFEs, it has several negative implications for Canadians and taxpayers:

1. *Increased purchases of international credits and increased overall cost of meeting Kyoto target.* Capping the domestic price at CDN$15/tonne means that Canadians will not invest in emission reduction opportunities that cost more than $15/tonne. Instead, LFEs will purchase domestic permits at $15. These will have to be matched by federal government purchases of international credits at the higher international price. If the international price is $20/tonne, this means that some of those $20 international credits could have been replaced by domestic Canadian reductions costing between $15 and $20/tonne. The purchase of international credits at $20 instead of less expensive domestic reductions increases the overall cost of meeting the Kyoto target.
2. *Very limited direct participation by LFEs in the international market.* If the international price is more than $15/tonne, LFEs will not buy international credits but will seek additional domestic permits from the federal government. The federal government will need to purchase an equivalent amount of international permits at the higher price, and will become effectively the only Canadian buyer in international markets.

3. *Costs are shifted to taxpayers*. The cap means that federal taxpayers subsidize the cost of allowances for LFEs if the international price exceeds $15. While this shields LFEs from the risk of high prices it shifts the cost burden to taxpayers. And while emitters can reduce their permit costs by cutting emissions; taxpayers do not have comparable options.
4. *Investment, jobs and co-benefits will be shifted out of Canada*. By causing the substitution of subsidized international credits for domestic reductions, the investment, jobs and co-benefits (air quality, other environmental and socio-economic benefits) associated with those domestic reductions are exported and lost to Canadians.

It is possible to combine a price cap with international emission trading, but it would require agreement on a single international price cap.

3. Auctioning of allowances

The proposed design of the backstop/covenant system would involve the free allocation of permits to LFEs based on current output and sector-specific allocation factors. The free allocation of permits is consistent with almost all other existing and emerging emission trading systems and is intended to ensure that existing emitters are not excessively penalized, especially where they operate in international markets and are unable to pass on permit costs to consumers.

However, some systems do allow for the auctioning of a portion of allowances, including the Acid Rain Program operated by the U.S. Environmental Protection Agency. The directive establishing the European Union emission trading system also allows Member States to auction a portion of allowances.

Title IV of the Clean Air Act Amendments, which established the U.S. Acid Rain Program, mandates that EPA hold or sponsor yearly auctions of allowances for a small portion of the total allowances allocated each year. The auctions help ensure that new units have a public source of allowances beyond those allocated initially to existing units. Moreover, the auctions help price information to the allowance market in the early stages of the regulatory program. EPA sets aside a Special Allowance Reserve of approximately 2.8 per cent of the total annual allowances allocated to all units. During Phase 1, when the allocated allowances total 5.7 million allowances annually, 150,000 allowances were available every year for auctions. During Phase 2, when allowance allocations total 8.95 million allowances annually, 250,000 allowances are earmarked annually for auctions. EPA returns proceeds and unsold allowances from the auctioning of reserve allowances on a pro rata basis to those units from which EPA originally withheld allowances to create the Special Allowance Reserve.[35]

The European Union has agreed to implement a GHG emission trading system beginning in 2005. During Phase 1, from 2005–2007, Member States will be allowed to auction up to five per cent of total allowances issued; in Phase 2, which corresponds to the Kyoto commitment period of 2008–2012, Member States will be able to auction up to 10 per cent of allowances.

The auctioning of all or a portion of allowances provides a number of possible benefits. Most importantly, an auction generates revenues for governments that can then be recycled to:

- *Reduce other distorting taxes that limit investment and growth*. There are a number of federal and provincial taxes that generate deadweight losses to the economy and discourage investment and job creation. Using auction revenues to reduce these taxes can create an added economic benefit (sometimes referred to as a "double dividend") from addressing climate change. The economic analysis of the "broad-as-practical" approach (page 50) confirmed the economic benefits of recycling (even though only a very simple approach to recycling was adopted that did not take advantage of the opportunity to reduce distorting taxes).
- *Directly address competitiveness and adjustment issues*. Funding can be targeted directly to where it is needed, in contrast to a gratis system that provides compensation in proportion to the allocation formula.

- *Provide incentives to develop and adopt lower-emitting technologies and processes*. New low-emitting technology will be critical to achieving long term emission reductions.
- *Limit windfall gains to upstream energy producers in a "broad-as-practical" system*. If, as discussed in the preceding section, the emission trading system is expanded to include all CO_2 sources, then the most practical way to capture the millions of individual sources is to require that upstream fossil fuel suppliers hold permits for the carbon content of fuels sold to domestic customers. This will result in an increase in the retail price of fossil fuels in proportion to their carbon content, and will provide the same emission reduction incentive for small sources as if they were required to hold permits. However, free allocation of allowances may result in a windfall gain to upstream fossil fuel suppliers. This can be avoided by ensuring that at least some of the allowances provided to fossil fuel suppliers are auctioned.

Other rationales for auctioning are less relevant in the context of Canada's Kyoto commitment:

- Auctions can be used to provide a price signal for market participants. This was one of the rationales for auctioning some SO_2 permits in the U.S. Acid Rain Program, However, the international GHG emission trading market is expected to provide a fairly clear price signal, and the availability of this market means that the auction price would be expected to closely approximate the prevailing international price.
- Auctions can also be used to guarantee that there are some allowances available for purchase by new market entrants. However, because the proposed Canadian system provides allowances on an intensity basis, all emitters (including new entrants) in the Canadian system will receive allowances equal to current production multiplied by the sector allocation factor.

Canada could consider auctioning a portion (5–10 per cent) of allowances during the later stages of the Kyoto commitment period to generate funding for technology and emissions reduction investments, and to pave the way towards a greater level of auctioning in later commitment periods.

Canada's Proposed Domestic Emissions Trading System

The federal government's proposals for a domestic emissions trading (DET) system were first presented as part of the *Climate Change Plan for Canada*. It undertook to develop a detailed scheme in 2003–2004, and to implement it "as soon as possible thereafter."

In Canada's proposed DET system, the federal government has indicated that on average LFEs will receive 85 per cent of their permits for free. But the federal government has also indicated that LFEs operating old and inefficient technologies may only receive 70 per cent of their permits for free based upon how much less efficient they are. Companies would then be required to close the gap between the permits they have been allocated and their actual emissions. They would be able to do this by reducing their emissions or either purchasing emission reduction credits from other LFEs as part of the backstop/covenant system, or acquiring offsets generated by approved schemes outside the backstop/covenant system.

Box 15. The trading advantage.

The emissions trading approach works well for greenhouse gases because they are fully mixed in the atmosphere. As a result, for example, a tonne of CO_2 emitted (or saved) in Canada has the same impact on the global climate as a tonne emitted (or saved) in India. (This is without reference to local impacts: for example, while it may not make a difference from a global climate perspective, there may be implications for local air quality.)

A recent review of emission trading schemes in the U.S. has concluded that "the use of emissions trading has enhanced—not compromised—the achievement of environmental goals." The authors add: "Emissions trading seems especially well suited to be part of a program to control greenhouse gas emissions."

From an environmental perspective, an important advantage of emissions trading is that heavily polluting industries are less able to appeal for special treatment on the grounds of hardship or high abatement costs.

Trading has other benefits as well. The fact that reductions in emissions have value and can be sold at any time provides a continuous incentive for innovation, both in operating procedures and in investment decisions. This encourages the development and implementation of new, clean technologies.

Pew Center on Global Climate Change: *Emissions Trading in the U.S.—Experience, Lessons and Considerations for Greenhouse Gases* (May 2003).

The backstop/covenant system

In the current context, the Canadian government defines a covenant as a negotiated agreement that is backed up by legal sanctions for non-compliance. The 55 Mt target for LFEs will somehow be distributed among the various sectors and companies, based on the outcome of negotiations.

Of the estimated 240 Mt CO_2 equivalent reduction in emissions required in the first commitment period,[36] the government expects 55 Mt to be delivered by LFEs—namely around 650 to 700 firms operating in the thermal electricity, oil and gas, and mining and manufacturing sectors. This would be achieved through a "covenant/backstop" system, under which LFEs would be given the opportunity to enter into an agreement with government to reduce their emissions (a covenant), or else be governed by a regulatory backstop which would provide a default target.

The nine industrial sectors proposed for inclusion in the covenant/backstop program are:

- thermal electricity generation (coal, oil and gas);
- oil and gas (upstream extraction, oil and gas pipelines, gas utilities, petroleum refining);
- mining (both metal and non-metal);
- pulp and paper production;
- chemical production (industrial inorganic chemicals, industrial organic chemicals) and chemical fertilizers and fertilizer materials;
- iron and steel production;
- smelting and refining;
- cement and lime production; and
- glass and glass container production.

Following the release of the Plan, the government made two further commitments that helped clarify the implications for industry:

- Canadian companies will be able to meet their emission reduction responsibilities at a price no greater than $15 per tonne; and
- With respect to the volume of emissions, the Government will set emissions intensity targets for the oil and gas sector at a level not more than 15 per cent below projected business-as-usual levels for 2010.[37]

Little detail has yet emerged about the mechanics of the proposed emissions trading program. However, the government envisages that a mechanism for trading greenhouse gas compliance units will probably be developed by the private sector, and that its own role should be limited to setting out and enforcing the rules. Transactions could be either for immediate delivery (the spot market), or for future settlement. The administrative requirements of the backstop/covenant system and potential opportunities for Manitoba are described in detail in the section beginning on page 75.

The offset system

In addition to the backstop/covenant system outlined above, the *Climate Change Plan for Canada* provides for the creation of "offsets." Agriculture, forests and landfills are identified in the plan as "having the potential to" create offset credits.

A discussion paper was prepared by the government of Canada in June of 2003 which laid out the details and lingering questions associated with an offset system. In the *Offset System Discussion Paper*, "the scope of the offset system is broadened [beyond agriculture, forestry and landfills] to include other sectors across the economy not covered by the backstop/covenant system for LFEs"[38] such as transportation fleets.

Offsets can occur in two forms:

1. GHG reductions – reductions in GHG emissions from activities not covered under the backstop/covenant system, such as livestock farming, landfills and transportation fleets, just to name a few.
2. GHG removals – increasing the amount of carbon stored in forests and soils, often referred to as carbon sequestration activities, or sinks.

GHG removals are a more complicated concept than reductions and thus warrant some further explanation. Forests remove carbon from the atmosphere during tree growth. Forest-related activities such as

afforestation,[39] reforestation,[40] deforestation,[41] and forest management[42] all have the potential to generate offsets under the current proposed offset system design. However, the inclusion of forest management activities is uncertain since the Kyoto Protocol gives Canada until 2006 to decide whether to include it or not. The uncertainty is whether Canada's forest management activities will actually be a net sink—there is the potential for Canada's managed forests to be a net source.

Soils can also remove carbon from the atmosphere. Excessive cultivation of land and summer fallowing releases carbon to the atmosphere. Improved cropland management[43] and grazing land management[44] practices can reverse this process creating sinks that remove carbon from the atmosphere. This has been the case for zero-tillage practices introduced in the Prairies in the early 1990s. As in the case of forest management, Canada has until 2006 to decide whether to include cropland and grazing land management practices in its GHG inventory.

The *Offset System Discussion Paper* put forth a set of criteria for determining whether GHG reductions or removals are eligible as offset projects. These criteria are summarized in Box 16.

Box 16. Federal government criteria proposed for determining whether GHG reductions or removals are eligible as offset projects.

1. *Inclusion in the inventory*. Offsets must be reflected in Canada's national inventory for Kyoto protocol reporting.
2. *Project start date*. To ensure offsets go beyond the national business-as-usual baseline, only those projects initiative after a specified start date will be eligible.
3. *Crediting period*. Only GHG reductions and removals that occur during 2008–2012 will be eligible to generate offset credits.
4. *Real*. Must be an identifiable project or activity that reduces emissions or increases carbon removals by a sink.
5. *Measurable*. Both the baseline and the actual reductions from the project must be quantifiable.
6. *Verifiable*. The reductions/removals must be verifiable.
7. *Surplus*. The reduction/removal or activity that causes it must exceed the level that might reasonably be expected will be achieved due to another government climate change measure. The reduction/removal or activity that causes it must not already be required by an existing federal/provincial/local regulation or operating certificate.
8. *Unique*. A GHG reduction/removal can only be used once.
9. *Ownership*. Project proponents must have transparent ownership rights to the GHG reduction/removal.

Source: *Offset System Discussion Paper*, Government of Canada, pp. 9–11, 2003.

A decision on whether or not to include the capture of landfill gases—a GHG reduction—in the offset system is not subject to the same 2006 decision timeframe as forest and cropland and grazing land management practices. The Climate Change Plan proposes "to consult on whether to regulate emissions reductions from new capture and flaring of landfill gas or allow them to be sold as offsets."

The administrative requirements of an offset system are described in detail in the section beginning on page 75, along with some potential opportunities in Manitoba.

Box 17. The federal government's interdepartmental Working Group on Offsets.

To formulate a policy on offsets, the federal government has set up an interdepartmental Working Group on Offsets (WGO) comprising representatives of Environment Canada, Natural Resources Canada, Agriculture and Agri-Food Canada and the CDM/JI office of the Department of Foreign Affairs and International Trade. During the summer of 2003 the WGO carried out a three-stage process (see below) which will culminate in detailed proposals for an offset trading scheme.

- *Step one: "Key Elements" paper*

The *Climate Change Plan for Canada*, published by the federal government in November 2002, envisaged that "agricultural and forestry sinks and emissions reductions" will be available for purchase by participants in its proposed emissions trading scheme. Further details of the proposed offsets system were circulated in May 2003 as a "Key Elements" paper, setting out the government's current thinking on the issue. The six-page document sets out principles and criteria that would determine eligibility for offsets, and identifies aspects that require further consideration.

- *Step two: Discussion paper plus regional consultations*

The second step in the WGO's work was the production of an *Offset System Discussion Paper*, released on June 10, 2003, which sets out options as well as asking specific questions. To obtain input from the provinces, the WGO held consultation meetings during the second half of June, in Toronto, Montreal, Halifax, Calgary, Vancouver and Regina.

- *Step three: Detailed design paper*

On the basis of its consultations, the WGO had planned to publish an *Offset System Design Paper* in the fall of 2003. This process has been delayed. This paper will be circulated for comment before the scheme is finalized. Detailed decisions on rules and protocols will be made during 2004.

Who is Required to Reduce Emissions Under Canada's Proposed Domestic Emissions Trading System?

The federal government has identified nine sectors of "large final emitters" (LFEs) for the proposed covenant (regulatory) component of Canada's domestic emissions trading system. The nine sectors are:

- thermal electricity generation;
- oil and gas;
- mining;
- pulp and paper;
- chemicals;
- iron and steel;
- smelting and refining;
- cement and lime; and
- glass.

By definition, all nine sectors have a large greenhouse gas impact. Table 4 lists the greenhouse gas "emissions intensity" of five of the sectors, defined as the tonnage of greenhouse gas emissions relative to gross output.

Table 4. Greenhouse gas emissions intensity of nine industrial sectors in Canada.

Sector	GHG emissions intensity (tonnes per $ million output, 1986 prices)
Steel manufacturing	1,447
Petroleum production*	917
Pulp and paper	607
Metal mining	463
Non-ferrous metal smelting and refining	276
Cement and lime	n/a
Glass	n/a
Thermal electricity generation	n/a

**includes extraction, transportation and refining*

Source: Environment Canada and Natural Resources Canada: Development of Greenhouse Gas Intensity Indicators for Canadian Industry, 1990 to 2000.

To determine which specific industrial corporations will be required to participate, it is anticipated that the federal government will use a GHG emissions threshold level below which there will not be permit obligations. Based on a threshold level, it is likely that very few industries in Manitoba will have to comply with the federal emissions permit requirements. By comparison, Environment Canada predicts that the total number of firms nationally participating in its backstop/covenant system will be between 650 and 700.

Table 5 summarizes what is known about the nine LFE sectors in Manitoba. The following sections examine Manitoba's presence in each of the nine sectors.

Table 5. Estimated number of LFEs in Manitoba, by sector.

Sector	Approx. number of companies
Thermal electricity generation	1
Oil and gas	40
Mining	4
Pulp and paper	2
Chemicals	25
Iron and steel	1
Smelting and refining	2
Cement and lime	1
Glass	0

Thermal electricity generation

Only three per cent of Manitoba's electricity is derived from fossil fuels. There are two thermal power stations in Manitoba, both operated by Manitoba Hydro. One is in Selkirk and the other is in Brandon. The Selkirk plant has a capacity of 121 megawatts and was recently converted from coal to natural gas. The Brandon plant has a capacity of 345MW, comprising one coal-fired unit and two recently-built natural gas units. (Natural gas releases around 30 per cent less CO_2 than coal when burned, for the same energy output.)

Oil and gas

Manitoba's oil production represents around 0.5 per cent of Canada's national output. No natural gas is produced in Manitoba. Oil extraction activity is concentrated in the southwestern corner of the province, where there are around 1,400 oil wells. In 2001, the value of oil sold in Manitoba was around $135 million.

Manitoba's oil industry is dominated by two companies—Chevron Canada Resources and Tundra Oil and Gas. Between them, they produce two-thirds of the province's output. However, there is a plethora of small, locally-based producers, whose output is typically well under one per cent of the total for Manitoba. These bring the total number of operators to around 40, though most will probably not be in the LFE group.

Crude oil produced in Manitoba is transported by pipeline to refineries in southern Ontario and the northern United States. Manitoba's last oil refinery, Shell St Boniface, closed in 1983.

Mining

Manitoba's mining and minerals industry represents around five per cent of the national output. Nickel accounts for 41 per cent of Manitoba's non-fuel mineral production. Other important commodities are copper, zinc, gold, and sand and gravel.

The province has eight operational metal mines, operated by Inco, Tanco, Kinross Gold, and the Hudson Bay Mining & Smelting Company. Mining activity is concentrated around Flin Flon, Thompson, Bernic Lake and Snow Lake. In addition, non-operational mines are located at Bissett, Lynn Lake and Leaf Rapids. The eight operational mines in Manitoba (as of May 2003) are listed in Table 6.

Table 6. Active mining centres in Manitoba.

Location	Name of mine	Operator	Minerals extracted
Bernic Lake	Bernic Lake Mine	Tanco	rare earths
Thompson	Thompson Mine	Inco	copper/nickel
Thompson	Birchtree Mine	Inco	copper/nickel
Snow Lake	New Britannia Mine	Kinross Gold	gold
Snow Lake	Chisel North Mine	Hudson Bay Mining & Smelting	copper/zinc
Flin Flon	Trout Lake Mine	Hudson Bay Mining & Smelting	copper/zinc
Flin Flon	Callinan Mine	Hudson Bay Mining & Smelting	copper/zinc
Flin Flon	777 Mine	Hudson Bay Mining & Smelting	copper/zinc

A large proportion of the greenhouse gas emissions associated with mining are produced by smelting and refining operations (*see below*), which often take place on the same site as the mine itself.

Pulp and paper

There are two pulp and paper mills in Manitoba. One is at Pine Falls, operated by Tembec Paper Group; the other is at The Pas, operated by Tolko Industries.

Chemicals

According to the Canadian Chemical Producers Association (CCPA), Manitoba and Saskatchewan between them account for two per cent of Canada's shipments of chemicals and chemical products, compared with 14 per cent from Alberta; 24 per cent from Quebec; and 55 per cent from Ontario. Manitoba has around 30 chemical plants, producing a wide variety of outputs. Statistics Canada ceased publishing detailed lists of these sites in 1995.

Iron and steel

There is one iron and steel plant in Manitoba, namely Gerdau MRM in Selkirk.

Smelting and refining

Manitoba currently has two refining and smelting complexes, both located at metal mines. One site in Thompson is operated by Inco, and the other is operated by Hudson Bay Mining & Smelting in Flin Flon. According to the Manitoba Mining Association, both sites reduced their greenhouse gas emissions intensity substantially during the 1990s through an investment in more efficient processing equipment.

Cement and lime

Manitoba's only lime-producing plant is operated by Graymont at a quarry complex near Faulkner, 230 kilometres north of Winnipeg. The greenhouse gas emissions from lime processing arise primarily from the liberation of carbon dioxide from calcium carbonate: they are thus an intrinsic part of the process. This means that the potential for reducing emissions through energy efficiency measures is limited.

According to Statistics Canada, none of the 12.6 million tonnes of cement produced each year in Canada originates in Manitoba.

Glass

No large glass manufacturing plants are operating in Manitoba.

What are Manitoba's Offset Opportunities?

As part of its proposals to establish an emissions trading program, the government is developing a mechanism that would allow "offsets" to be created and sold. Individuals and organizations outside the covenant/backstop scheme will be able to earn credits for offsets either by reducing emissions from a source that is not covered by the covenant/backstop scheme, or by sequestering greenhouse gases from the atmosphere. They will then be able to sell those offset credits to industrial emitters operating within the emissions trading system.

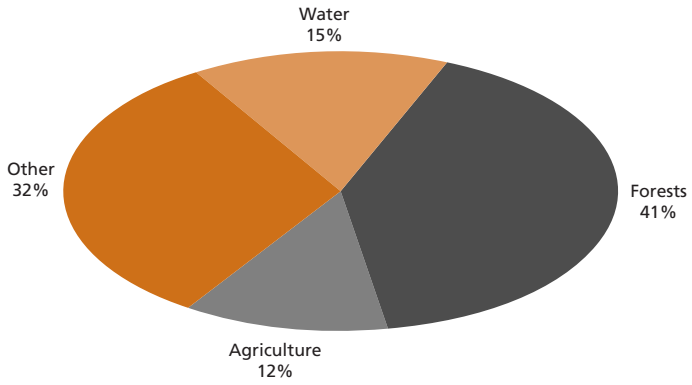
There are significant opportunities in Manitoba to be suppliers of offsets in Canada's domestic emissions trading system. Four areas appear to be particularly promising. They are:

- livestock rearing and manure management;
- cropland and grazing land management;
- afforestation and reforestation; and
- landfill gas capture.

Box 18. Manitoba's surface characteristics.

As Figure 6 shows, more than half of Manitoba's 65 million hectares are covered by water or by trees. Of the remaining 28 million hectares, half has agricultural potential. Around 7.6 million hectares of this—12 per cent of Manitoba's total area—is currently in agricultural production.

Figure 6. Manitoba's surface characteristics.



Sources: Manitoba Agricultural Review and Natural Resources Canada: The State of Canada's Forests.

Box 19. The government's dilemma over offsets.

The federal government's position on offsets, when it emerges, will be a compromise between two opposing goals.

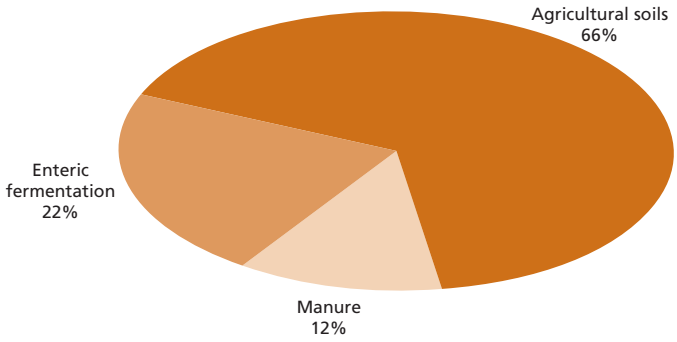
On the one hand, the government wants to find ways of helping large final emitters (LFEs) meet their 55 Mt emissions reduction target. For many industries, the ability to purchase emission offsets, rather than delivering "real" emission reductions, will be vitally important.

On the other hand, however, offset projects contribute nothing towards Canada's overall emission reduction target outside of the LFEs 55 Mt of CO_2 target. The government will be hard-pressed to meet their emissions reduction goal of six per cent below 1990 emissions,[45] especially if economic growth between now and 2012 is higher than forecast. It is therefore looking at every possible source of emission reductions in its effort to meet the national target. Any reduction in emissions that is packaged and sold as an offset is effectively "lost."

Livestock rearing and manure management

In 2001, agriculture was responsible for one third of Manitoba's greenhouse gas emissions (expressed as CO_2 equivalent). The majority of agricultural emissions are in the form of nitrous oxide released from fertilizer-rich soils. The remainder is mostly methane from manure and from enteric fermentation (*see Figure 7*). Because nitrous oxide and methane are both more potent greenhouse gases than CO_2, efforts to curb their emissions can be particularly worthwhile.

Figure 7. Greenhouse emissions from agriculture in Manitoba.



Source: IISD, Manitoba and Climate Change: A Primer (2001).

Manitoba's contribution to the Canadian livestock industry (*see Table 7*). Hogs, beef cattle and egg production are strongly represented in the province, in terms of both economic activity and greenhouse gas emissions. In 2001, livestock farming in Manitoba produced 2.78 million tonnes of CO_2 equivalent, or nearly 14 per cent of the province's total emissions.[46]

Table 7. Livestock farming in Manitoba, 2001.

Livestock type	Manitoba's % of Canadian output
Hogs	24.0
Eggs	13.0
Beef cattle and calves	9.2
Turkeys	7.3
Sheep and lambs	6.7
Chickens	4.4
Dairy cows	4.0

Source: Manitoba Agricultural Review.

A detailed review of the options available for reducing livestock emissions has been produced by Karin Wittenberg and Dinah Boadi.[47] These are summarized below:

Options for reducing greenhouse gas emissions from manure:

- reducing dietary protein;
- improving feed efficiency;
- type of handling system in barns;
- type of manure storage system; and
- type and time of land application of manure.

Options for reducing enteric greenhouse gas emissions:

- promotion of high-quality forages in ruminant feeding and grazing systems;
- feed and animal management;
- feed additives;
- addition of fats to grain diets;
- compounds that inhibit methane production; and
- growth hormones.

As well as the various options for reducing livestock emissions at source, opportunities exist for capturing the methane contained in manure and converting it to a combustion fuel (biogas), using an aerobic digester. According to one specialist, Phil Lusk of Resource Development Associates, there are non-commercial reasons for investing in digesters, including odour control, nutrient stabilization and pathogen reduction.[48] Biogas from anaerobic digestion can be used to produce electricity or heat, either *in situ* or in centralized facilities.

Box 20. Hog farm mitigation options.

The Canadian Pork Council, in its *Greenhouse Gas Mitigation Strategy for the Canadian Hog Industry*, has identified four management practices which it says would "mitigate significantly" the greenhouse gas emissions from hog farms. They are:

- better manure application and storage management;
- better soil management;
- manure treatment; and
- improved feed strategy.

Methane produced in the digestive system of farm animals—principally pigs, cattle and sheep—is responsible for eight per cent of Manitoba's greenhouse gas emissions, expressed as CO_2 equivalent.[49]

Livestock rearing

The paragraphs below focus on measures that can be put in place to reduce emissions from this source. Since the greenhouse gas predominantly associated with livestock is methane, a greenhouse gas 20 times more potent than CO_2, actions to reduce emissions in this area can be particularly lucrative in terms of offset credits.

Reduce digestion time in ruminants

By reducing the amount of time that feed spends in the animal's rumen, it is possible to curb the amount of methane produced. This can be done by (a) using easily digestible feeds such as grains, legumes and silage; (b) harvesting forages at an earlier, more succulent growth stage; (c) chopping the feed to make it more easily digestible; (d) reducing the use of fibrous grasses and hays; and (e) feeding concentrated supplements.

One study has shown that methane emissions from steers were 50 per cent lower when the animals had access to high-quality pastures rather than matured pastures. Similarly, pastures that contain legumes such as alfalfa have been shown to reduce emissions significantly.[50]

Add edible oils to diets

Adding oils such as canola and coconut to the diet of ruminants can reduce methane production by inhibiting the activity of methane-producing bacteria. This practice is effective but expensive. According to Climate Change Central, this practice can also be adopted in hog production. Adding canola oil to the diet of swine can reduce emissions by up to a third.[51]

Use ionophores

Ionophores such as monensin and lasolocid are feed additives that inhibit the formation of methane by rumen bacteria. They have been shown to reduce methane emissions from dairy cows by 28 per cent.[52] However, gut bacteria have been known to adapt to ionophores, limiting their effectiveness.

Reduce dietary nitrogen

Emissions of N_2O from pig manure can be curbed by reducing the amount of protein in the diet, and adding synthetic amino acids instead.[53]

Introduce different bacteria into the rumen

Research has shown that it is possible to introduce bacteria that produce less methane into the digestive system of ruminants. However, this technique is not yet commercially viable.

Improve animal management to increase efficiency

In general, better efficiency in livestock production leads to lower emissions per unit of output. Areas for improvement include careful formulation of diet to avoid overfeeding or underfeeding; matching diet to stage of life cycle; disease control; reproductive health; and genetics. The benefits arising from these kinds of activity, in terms of greenhouse gas emissions, can be difficult to quantify.

Manure management

Farm manure is responsible for five per cent of Manitoba's greenhouse gas emissions, expressed as CO_2 equivalent.[54] This section presents some of the measures that are currently available for reducing emissions from manure management.

The main greenhouse gas associated with liquid and stockpile manure is methane. However, composted manure releases much less methane (*see below*), since it decomposes aerobically. In this case the principal greenhouse gas is nitrous oxide (N_2O).

Switch from liquid to solid manure handling and composting

Liquid or slurry manure systems promote anaerobic decomposition, which leads to methane. Solid manure contains more oxygen, and so CO_2 tends to be produced instead. The best option of all is aerobic composting. This is done by aerating stockpiled manure, which involves either frequent turning or the introduction of ventilation. Dairy cattle manure stored in the form of compost releases just a quarter of the greenhouse gas emissions (methane, CO_2 and N_2O) associated with slurry. Beef manure, when composted, produces just six per cent of the greenhouse gases from slurry.[55]

Reduce the amount of straw bedding in manure

Manure that contains less straw bedding has less carbon available for generating methane emissions.

Store manure at low temperatures

The rate at which methane is generated from manure is a function of temperature. Storing manure at as low a temperature as possible—for example, by insulating the tanks or placing them in the ground—minimizes emissions of methane.

Minimize manure storage times

Once applied to land, manure releases very little methane, because it is in contact with an aerobic environment. Therefore minimizing storage time can reduce greenhouse gas emissions—weather and planting schedules permitting.

Avoid landfilling manure

Landfilling of manure creates the anaerobic conditions that favour methane production. Any switch away from landfilling, for example to composting or spreading on land, will lead to a reduction in methane emissions.

Incinerate methane as a fuel

Methane released from stored manure can be collected and burned to produce CO_2, a less potent greenhouse gas. To obtain added value, the energy can be used for heating or electricity production.

Cropland and grazing land management

Agricultural soils in Manitoba are responsible for a remarkable 20 per cent of the province's greenhouse gas emissions, expressed as CO_2 equivalent. This high percentage reflects the fact that the principal greenhouse gas released from soil is N_2O—which is over 300 times more potent than CO_2. This section focuses on measures that can be taken to reduce N_2O emissions from agricultural soils, as well as to add carbon to them.

In general, reducing N_2O emissions involves either preventing the accumulation of excess nitrate fertilizer in the soil, or avoiding soil conditions that favour denitrification (the conversion of nitrate to nitrogen gas and N_2O).

Manitoba has nearly five million hectares under crops—more than eight per cent of its total land area—so the potential for offsets is substantial. The limiting factor tends not to be geography, but rather economics.

The Sinks Table examined various options for improved soil management as a means of sequestering carbon. The most promising of these appears to be the introduction of conservation practices such as zero tillage on crop land. Manitoba has nearly five million hectares under crops, so the potential for sequestering carbon by this means is substantial. The critical issue is whether an economic case can be made for it.

The Working Group on Offsets reports that zero-till cropping increases soil carbon content at a rate of 0.54 to 1.34 tonnes per hectare per year. Over a 20-year period, sequestration gradually declines until the soil reaches its saturation limit. According to the Sinks Table, cost estimates vary widely, with a lower limit of $0.60 per tonne of CO_2 and an upper limit of $6.33.

Three other soil management activities were assessed, namely pasture management, conversion of marginal cropland to grass, and wetland restoration. The contribution that these could make is more modest, as Table 8 illustrates.

The figures suggest that cropland conservation and the conversion of marginal cropland to grass could be commercially viable, provided that the offsets generated attracted a price of around $5 per tonne.

Table 8. The potential of soil carbon sequestration activities (all of Canada).

Activity	Sequestration rate (Mt CO_2 per yr) 2008–2012	2013–2018	Cost per tonne CO_2
Cropland conservation measures	18.3	18.1	$0.60 – $6.33
Pasture management	0.7	2.5	$8 – $10
Conversion of marginal cropland to grass (50,000 hectares per yr)	2.2	2.2	$3.35
Wetland restoration (100,000 hectares per yr)	2.9	2.9	n/a

Source: Sinks Table Options Paper, Land-Use, Land-Use Change and Forestry in Canada and the Kyoto Protocol, 1999.

In 1989, the Government of Canada announced its Permanent Cover Program, a scheme designed to promote soil conservation in marginal croplands on the Prairies by converting them to more sustainable uses. Some 4.9 million hectares of land were identified as being suitable for conversion to permanent cover. Of this, around 0.5 million hectares have been converted to date. The Government of Canada estimates that the remaining 4.4 million hectares, if converted to permanent cover, could sequester up to 50 million tonnes of carbon (equivalent to 180 million tonnes of CO_2) from the atmosphere. This estimate is broadly in agreement with the 2.2 Mt of CO_2 a year suggested by the Sinks Table, reported in Table 8. Additional benefits besides carbon sequestration include improved water quality, greater biodiversity, and reduced soil degradation.[56]

The following points focus on measures that can be taken to reduce N_2O emissions from agricultural soils while adding carbon to them.

Match fertilizer use to plant needs

The challenge when applying nitrate fertilizer is to use as much as the growing plants need, but no more. As well as wasting money and polluting groundwater, excess nitrate application gives rise to N_2O emissions. Various tools are available for fine-tuning fertilizer application, including soil tests and "precision farming."

Optimize the timing of nitrogen application

Ideally, nitrate fertilizer or manure should be applied to the crop just before the time of maximum uptake, so that nitrate does not accumulate in the soil. This means, for example, avoiding application in the fall. Similarly, ploughing-in of nitrogen-rich crops like legumes is ideally done in such a way that the nitrogen release coincides with crop demands.

Apply manure to the soil

Manure, when added to agricultural soil, can increase its carbon content by more than 50 per cent. Much of the sequestered carbon comes directly from the manure, but some is the result of accelerated plant growth. However, the way in which the manure is applied, and the amount used, can affect N_2O emissions. When applied in bands, liquid manure tends to generate more N_2O than if it is applied evenly to the soil surface, because concentrating the nitrogen and carbon together creates conditions that favour denitrification. For the same reason, applying excessive amounts of manure can create N_2O emissions.

Specific cropland and grazingland practices offset opportunities are introduced below.

Improve soil aeration

Low oxygen levels in the soil promote denitrification. This means that N_2O emissions can be reduced by aerating the soil. This might be done using tillage practices that improve soil structure, or by draining waterlogged soils.

Switch to a different fertilizer

Different types of nitrogen fertilizer have varying rates of N_2O emissions, ranging from nitrates to ammonia. In addition, slow-acting formulations such as sulphur-coated urea release their nitrogen gradually, reducing the likelihood of nitrate accumulating in the soil and generating N_2O emissions.

Place fertilizer in the soil more efficiently

Fertilizer is most effective when placed close to the plant's roots, allowing less to be used. However, care is needed because placing fertilizer too deep in the soil or concentrating it in bands can increase N_2O emissions.

Use nitrification inhibitors

Chemicals are available that, when applied with fertilizers and manures, inhibit the formation of nitrate from ammonium. This can suppress the formation of N_2O.

Switch to conservation tillage

Minimum and zero tillage, also known as conservation tillage, were originally put forward as a means of reducing soil erosion and conserving water. More recently, they have been recognized as a means of increasing soil carbon content. Studies have shown that they can increase soil carbon content by up to 10 tonnes per hectare (equivalent to 36 tonnes of CO_2 sequestered), over a period of 10 to 20 years. However, other trials have detected no benefit at all.[57] The Agriculture and Agri-Food Climate Change Table predicts a "significant reduction" in greenhouse gas emissions as a result of conservation tillage.

The Working Group on Offsets reports that zero-till cropping increases soil carbon content at a rate of 0.54 to 1.34 tonnes per hectare per year. Over a 20-year period, sequestration gradually declines until the soil reaches its saturation limit.

Avoid summer fallow

Summer fallow, the practice of leaving agricultural land unplanted for a year at a time, has been shown to reduce soil carbon content. This is because the soil carbon decomposes more rapidly, and because there is less carbon input to the soil during fallow periods. Studies in Saskatchewan spanning several decades have shown that soils that are cropped continuously contain several tonnes per hectare more carbon than soils that are fallowed every second year.[58] However, the benefits may be offset by increased fertilizer use, and hence higher N_2O emissions.[59]

Return cultivated land to grassland

A study in Alberta has shown that cropland that is allowed to return to native vegetation rapidly sequesters large amounts of carbon from the atmosphere—around 50 grams per square metre. The benefit was twice as pronounced when a non-native species, crested wheatgrass, was introduced. The Sinks Table[60] estimated the cost of sequestering carbon by this means to be $3.35 per tonne of CO_2.

Optimize grazing land management

The carbon content of grazing land can be increased in a number of ways. The Agriculture and Agri-Food Climate Change Table identified three: (i) reducing the number of cattle on overgrazed land and increasing the use of feedlots; (ii) introducing different grazing methods; and (iii) increasing the use of rotational grazing. The AAFCCT predicted a four per cent reduction in greenhouse gas emissions as a result of these actions.

Afforestation and reforestation

Afforestation (the planting of trees on land that was not previously forested) and reforestation (replacement of trees on land that was once forested) both represent promising areas for the development of offsets. However, the federal government has yet to decide whether a related area of offset activity, namely forest management, will be eligible to generate offset credits. If it is, then this will open the door for protective measures like pest control, fire prevention and replanting of harvested areas to earn offset credits, on the grounds that they increase forest growth relative to "business-as-usual."

The main obstacle facing afforestation and reforestation is that they are, by their nature, long-term actions. In the first commitment period (2008–2012), newly-planted trees will be too immature to sequester anything more than a minor amount of carbon. As a consequence, the cost per tonne of CO_2 sequestered would be huge. Tree-planting only begins to be a cost-effective source of offset credits when the accounting is done over a much longer timescale. As yet, the federal government has made no decisions beyond the first commitment period.

Box 21. The Sinks Table.

As part of the National Climate Change Process (NCCP), the federal government convened 16 "issues tables" to examine particular aspects of climate change mitigation. One of these, the Sinks Table (1999), investigated the potential for carbon sequestration through afforestation and reforestation.

The Sinks Table (*see Box 21*) concluded that over a 50-year timescale, shelterbelts and block plantations in the prairie provinces could be a cost-effective form of sequestration, absorbing CO_2 from the atmosphere at a cost of between $3 and $4 a tonne. Fast-growing species have the advantage of sequestering more in the early years, but they have a shorter lifespan. Native species grow more slowly but last longer—and they also help to foster other native flora and fauna.

The estimated costs and benefits of two large-scale tree-planting options are summarized in Table 9.

Table 9. Costs and benefits of tree-planting projects.

Action	Schedule	Average annual CO_2 sequestration, 2000–2050	Cost	Cost-effectiveness per tonne of CO_2, 2000–2050
Plant shelterbelts on private lands in the Prairies	13,000 hectares per year, 2001 to 2015	0.58 Mt	$107m	$3.70
Plant block plantations on private lands in the Prairies	20,000 hectares per year, 2001 to 2015	1.43 Mt	$214m	$3.00

Source: Sinks Table Options Paper, Land-Use, Land-Use Change and Forestry in Canada and the Kyoto Protocol, 1999.

A report by Nawitka Renewable Resource Consultants,[61] commissioned jointly between the Sinks Table and the Forest Sector Table, evaluated the potential for afforestation in the three Prairie provinces. The report estimated that around 5.7 million hectares of farmland in Manitoba, Saskatchewan and Alberta are "biophysically available" for afforestation—about 10 per cent of all agricultural land in the Prairies.[62] Key conclusions of the Nawitka report are:

- The total amount of land that could realistically be afforested over a 15-year period is well below the "biophysically available" area of 5.7 million hectares. As a consequence, "land availability is not a limiting factor."
- A more pertinent question relates to the ownership of this land. As the Nawitka report puts it, "an ambitious program would require participation of thousands of private land owners." Such a program "will not be implemented unless it makes economic sense for many individual owner-operators to start growing trees." The authors believe that a participation rate of 25 per cent is realistic. In Manitoba, this equates to just under 5,000 farms, covering an area of 49,000 hectares.
- A hypothetical afforestation program drawn up by the consultants would sequester about two million tonnes of carbon in the first commitment period (2008–2012), and 150 million tonnes over 50 years. The cost would be around $3.80 per tonne.

Box 22. The problem of non-permanence.

Greenhouse gas offsets that rely on sequestration—for example tree planting or conservation tillage—bring with them a fundamental problem in the form of non-permanence. Any carbon that is locked up in new biomass must stay there if the offset is to be of any value. The length of time for which it must remain sequestered is a matter of judgment, but it is likely to be upwards of 20 years, and possibly as long as 100 years.

The federal government's Working Group on Offsets is grappling with the problem of non-permanence, among other things, and attempting to build into its program mechanisms that will provide an incentive for offsets to be preserved.

Box 23. Poplar plantations for strand board mill products.

The Forest Products Association of Canada (FPAC)[63] concluded in a technical paper prepared for this task force that Manitoba has an opportunity to create significant greenhouse gas (GHG) offsets by planting 75,000 hectares with fast growing hybrid poplar on pasture land that was once forested. FPAC estimates that such a program can:

- provide enough wood fibre to support a world-class oriented strand board mill after 20 years;
- sequester an estimated 1.8 Mt of CO_2 each year;
- create 130–150 permanent high paying manufacturing jobs;
- provide a new source of income and crop diversity for Manitoba farmers; and
- restore and increase the biodiversity of pasture lands that were originally forest cover.

The establishment of a 75,000 hectare plantation program could occur over a twenty year period. The annual costs of plantation establishment are estimated at $1.1 million per year with an additional lease payment to land owners of $100 per hectare per year. The payback on this investment is approximately one year at average market conditions.

The federal government did recognize in its analysis of a potential offset system that the slow returns on tree-planting may lead landowners to consider it uneconomic:

> Since most costs for project development and implementation are up-front, the magnitude of credits awarded in the first commitment period… may not provide the minimum incentive needed for project developers.[64]

An important realization is that the feasibility of afforestation projects may be improved if other benefits besides carbon sequestration are brought onto the balance sheet. According to the Sinks Table:

> … an intent to achieve goals beyond just carbon sequestration—such as environmental, land management goals—could be the most successful approach to the development of afforestation programs.

Box 24. Time scale.

An important consideration in forest carbon sequestration is the time scale. The short-term cost-effectiveness of tree-planting is poor, but as trees mature they begin to sequester significant amounts of carbon from the atmosphere. In other words, the amount of carbon sequestered per dollar spent rises over time, before reaching a peak and then declining.

This means that in the first commitment period (2008–2012), even an aggressive program of planting fast-growing trees is likely to be a prohibitively expensive option for mitigating greenhouse gas emissions. The Sinks Table estimates that planting 50,000 hectares of fast-growing trees on private lands across Canada would carry a cost of more than $22 per tonne of CO_2 sequestered in the first commitment period—even assuming that the planting began in 2001. If such a scheme began today, the cost would be even higher.

Capture of methane emissions from landfills

Landfill gas is comprised of about 50 per cent methane. It is a potential energy source and a powerful GHG that contributes to global climate change. Landfill gas may be captured with a series of wells. The gas can then be collected and flared to destroy the methane or used to generate electricity or provide heating.

The City of Winnipeg and Manitoba Hydro are in the final stages of entering into an agreement to jointly study landfill gas collection at the Brady Road Landfill site. This agreement will establish a formal relationship between these parties under which options for landfill gas capture and utilization will be assessed. Such a project could provide a relatively low-cost opportunity to reduce greenhouse gas (GHG) emissions.

A preliminary feasibility study suggested, that under some scenarios, a landfill gas project at the Brady Road Landfill could provide cost-effective emission reductions. However, the pre-feasibility study used theoretically modeled estimates of landfill production rates which may or may not prove to be accurate for the Brady Road Landfill. This pre-feasibility study indicated potential for annual emission reductions of about 0.24 Mt CO_2e (in 2010). This suggests that the project could contribute significant emission reductions of about one per cent of Manitoba's current total provincial annual emissions (20.9 Mt CO_2e in 1999). The Summit and Kilcona landfills were also examined in the pre-feasibility study, and there are additional landfills throughout Manitoba with potential.

A more comprehensive feasibility study will be required before it is appropriate to determine if the project should proceed. Some key aspects of the full feasibility study will be:

- field testing and analysis to better estimate landfill gas quality and production rates;
- economic analysis of potential options such as simple flaring, electrical generation and/or heating applications;

- examining the impacts of development on the City of Winnipeg's existing and future landfill operations;
- assessment of other environmental and social considerations associated with this project; and
- confirmation that the federal government will include this type of project under its offset program and that a reasonable GHG price will be available.

The federal government has suggested that landfill gas emission reductions could be achieved by regulating landfills to undertake these types of projects. However, this is an area of traditional provincial authority and it is questionable whether provincial governments will chose to enact regulations that would add significant costs to municipalities when there is a more cost-effective market driven alternative available. It has been suggested that the federal government could take some form of unilateral action on landfill emission regulation but this also seems questionable, given that there are so many significant federal/provincial/territorial GHGs to resolve.

Other opportunities

Other potential opportunities for offsets in Manitoba, pending of course the federal government's decision on the scope of the offset system, could include:

- emissions reductions by large final emitters in areas not covered by the covenant/backstop scheme; and
- transportation fleet modifications and demand management.

Further research is needed to establish the scope for these activities in Manitoba, as well as their cost-effectiveness.

Box 25. Baselines.

An important element in the quantification of offsets is the baseline from which an offset is calculated. The function of a baseline is to ensure that any reduction in emissions, or sequestration of atmospheric carbon, is additional to what would have occurred under a "business as usual" scenario.

The way in which a baseline is calculated can have a major bearing on the size of the offset credit that is generated. More seriously, there are circumstances in which landowners may be given a perverse incentive to release carbon into the atmosphere just prior to the accounting period, in order to obtain the lowest possible baseline from which to start.

The various baseline options currently under review are set out in detail in the Government of Canada in the *Offset System Discussion Paper*.

What are the Administrative Requirements of a Domestic Emissions Trading System?

This section discusses the administrative elements required for implementation and operation of a national emission trading system that would include both a large final emitter (LFE) backstop/covenant system and an offset system.

The offset system will have different administrative elements from the main backstop/covenant system. The main reason for this is that while allowances will be distributed to LFEs based on emission factors and entity output, offset credits will be created on a project-by-project basis from eligible reduction/removal activities.

Possible roles for Manitoba's public and private entities, other than as LFE participants or project proponents/developers, are identified below. The administrative elements of sub-national or provincial trading systems, such as the system proposed by Alberta, are not discussed, but the elements would be similar.

The nature and extent of opportunities for Manitoba private and public entities will depend on whether responsibility for multiple elements is combined and assigned to single entities (e.g., validation and verification), and whether responsibility for elements is delegated to non-government entities. The role of provincial/territorial governments in administering the national backstop/covenant and offset systems will also be important.

Backstop/covenant system

The federal government is proposing to establish emission targets for LFEs through a system of covenants or a backstop regulation. The discussion here assumes that LFEs with operations covered by the backstop/covenant system will be assigned intensity-based targets equal to the product of current output (estimated or actual) and a sector-specific (or subsector-specific) emission factor. The entities are assumed to be allocated, free of charge, allowances (or domestic compliance units) equal to the entity target.[65]

The effective operation of the backstop/covenant system requires that emissions be measured, monitored, reported, and verified in a credible and consistent fashion. The system also requires a mechanism for tracking the exchange of tradable compliance units. These elements are discussed below and summarized in Table 10.

Monitoring and quantification of emissions and output

Large industrial emitters with targets will be required to monitor and quantify (measure or estimate) their emissions and their output on a regular basis, probably annually. The measurement of output is needed in order to determine the emission target for the entity, or the number of allowances that will be allocated.

Standard protocols for monitoring and quantifying greenhouse gas emissions will need to be defined. For energy-related CO_2 emissions, measurement is relatively straightforward since an accurate estimate of these emissions can be made from energy use and standard emission factors. Quantification of non-energy CO_2 emissions and emissions of other gases is less straightforward. Some emissions can be measured directly, while others must be estimated.

Quantification protocols will need to be consistent with the methods used to construct Canada's national inventory of greenhouse gas emissions, and with the methodologies published by the Intergovernmental Panel on Climate Change (IPCC). A considerable amount of work on the measurement and estimation of emissions has been carried out by government and non-government agencies, including Canada's Greenhouse Gas Verification Centre, Canadian emission trading pilots (PERT and GERT), the International Standards Organization (ISO), the World Business Council for Sustainable

Development, and others. A number of standard quantification protocols are available in the public domain.

Opportunities for public entities in Manitoba could include housing a national verification centre that would develop and publish standard emission quantification protocols and other measurement and monitoring tools. Opportunities for private entities could include providing support to LFEs in the quantification of emissions.

Reporting

Large industrial emitters will be required to report their emissions with sufficient detail to allow for verification. The reporting format will need to be defined, and decisions will be needed on whether reports or selected information will be made public. A public registry for emissions reporting may be required.

Opportunities for public entities in Manitoba could include housing a public registry for LFE emission reporting. Opportunities for private entities could include providing support to LFEs for emission reporting.

Verification

Verification is the systematic, impartial and documented review and/or determination of monitored and reported emissions. It may be carried out by an independent third party that has been accredited by the authority responsible for the LFE backstop/covenant system.

The system may require that all LFE emission reports be verified, or it may rely on self-reporting with audits carried out by the government or accredited verifiers.

Standards for verification will be required, as well as systems for the accreditation of verifiers. Verification standards have been developed or are under development by a variety of government and non-government organizations.

Opportunities for public entities in Manitoba could include verification of emission reports, if this responsibility is assigned to a government agency. If verification is assigned to accredited entities, there may be opportunities for Manitoba's accounting and engineering firms.

Tracking of compliance unit transactions

Large industrial emitters and other entities that are allowed to trade will be required to report any transactions of domestic compliance units (whether allowances or credits). A registry will need to be established to track the ownership of domestic compliance units. This could be combined with, or linked to, Canada's national registry.

Registries for tracking ownership of domestic and/or international compliance units could be located in Manitoba. Since registry activities will be largely electronic, there should be no geographical constraints.

Compliance

Large industrial emitters will be required periodically to submit domestic compliance units (allowances or offset credits) to cover their emissions. The compliance period could be one year or the entire five-year Kyoto commitment period.

Table 10. Elements of the LFE backstop/covenant system.

Element	Responsibility	Supporting tools/ mechanisms/standards	Existing and Draft Standards	Opportunities for Manitoba entities
Monitor, measure, quantify emissions and output	Entity	Standards (protocols) for measuring or estimating emissions	• ISO 14064-1 • WRI/WBCSD GHG Protocol	Public: development of quantification protocols Private: support to LFEs for quantification
Report emissions and output	Entity	Reporting requirements		Public: house emissions registry Private: support to LFEs for quantification
Verify emissions	Government or independent third-party verifier	Verification standards (protocols)	• ISO 14065-3 • Accounting standards : GAAS, IAASB	Public: verification centre Private: accredited verifiers
		Accreditation process for verifiers	• Professional accreditation requirements	Public: accredit verifiers
Certify emissions	Government or independent third-party verifier			Public/private: certify emissions, depending on responsibility for verification
Track transactions in allowances/credits or international compliance units	Registry for tracking compliance units			Public: registry Private: brokers and market facilitators

Offset system

The backstop/covenant system for LFEs is expected to allow the use of offset credits for compliance with emission targets. Offset credits will likely be generated from landfill gas projects, forestry and agricultural soil sequestration projects, as well as projects in other sectors that reduce emissions or increase removals of greenhouse gases.

Unlike the backstop/covenant system, offset credits are created after the fact, and must be approved separately for each project. A significant difference is the inclusion in the offset administration system of a separate validation stage prior to project start-up.

The main elements of the offset system are discussed below and summarized in Table 10.

Project development

Proponents will be responsible for developing projects, assembling finance and other support. Manitoba's private and public entities may be able to play a role in facilitating project development, possibly through the aggregation of small projects.

Validation

Validation is the process of ensuring that a proposed project satisfies the eligibility requirements of the offset system. The proponent provides documentation on the project, including the proposed methodology for quantification and reporting, to the government agency responsible for the offset program or to a designated entity. This documentation is reviewed and, if it is accepted, the project is validated and is eligible to create credits. Validation normally takes place prior to project start-up, and may be a condition of project financing.

Information on validated projects may be housed in a registry of offset projects. Some or all of the project information may be publicly available.

Validation could be carried out by accredited entities or by a government agency. The validation process can be lengthy, and will usually require an element of judgment on the part of the verifier. Experience with the Clean Development Mechanism and other project-based emission trading systems suggests that the cost of project validation can be significant. If private accredited entities are responsible for validation, these costs will likely need to be recovered from project proponents, and could prove to be a significant barrier to project development. Validation by a government agency may provide fewer barriers to project development.

Opportunities for Manitoba public entities related to validation could include:

- housing a national validation centre: and/or
- housing a national offset project registry.

If validation is assigned to accredited entities, there may be opportunities for Manitoba accounting and engineering firms.

Quantification of reductions/removals

The project proponent is normally responsible for quantifying project reductions/removals, according to the monitoring plan approved as part of the validation. This obligation is similar to the monitoring and measurement of emissions that LFEs are required to undertake, and requires the development of similar quantification protocols. A number of these have been developed or are under development through Canada's Greenhouse Gas Verification Centre, the International Organization for Standardization, the World Business Council for Sustainable Development and others.

Opportunities for public entities in Manitoba could include housing a national verification centre that would develop and publish standard emission quantification protocols and other measurement/monitoring tools. Opportunities for private entities could include providing support to offset producers for measurement, monitoring and reporting of emissions.

Reporting of reductions/removals

Offset producers will be required to submit regular reports to the government or to an accredited verifier on reductions/removals that they have achieved. Reports will need to be consistent with the monitoring plan approved as part of validation, and must include sufficient detail to allow for verification.

Manitoba entities may be able to provide reporting services to offset project proponents.

Verification and certification of reductions/removals

Verification is the process of reviewing the monitored emission reductions/removals to ensure that they meet the requirements of the offset system. Verification could be done by a public entity or entities, or by independent, accredited private entities. If verification and validation are both carried out by accredited entities, it may be necessary to separate the two functions.

Certification is the end result of the verification process, i.e., a written assurance by the verifier that a project has achieved the reductions/removals determined by the verifier or asserted by the proponent. Certification may be required before offset credits can be issued.

Verification-related opportunities for Manitoba public entities could include housing one or more national centres for verification of reductions/removals. Because of the specialized expertise required, it may be preferable to have separate verification centres for different types of offsets. If verification is assigned to accredited entities, this may present opportunities for Manitoba's accounting and engineering firms.

Issuance of credits and credit transactions

After reductions/removals are verified and certified, they must be given final approval by government. Tradable offset credits are then placed in the producer's account in the domestic compliance unit registry. The latter could be combined with, or linked to, Canada's national registry, which tracks transactions and ownership of international (Kyoto) compliance units.

A mechanism for exchanging domestic compliance units (allowances and credits) for international units will need to be defined. The federal government's offset discussion paper suggests that the government will be willing to exchange domestic and international compliance units on a one-for-one basis.

Opportunities for public entities in Manitoba could include:

- housing the national program authority responsible for issuing credits; and/or
- housing the registry or registries for international and domestic compliance units.

There may also be opportunities for Manitoba businesses to act as brokers or other market intermediaries. Depending on the volume of trading, there may be an opportunity to establish a formal exchange.

Table 11. Offset system elements and opportunities for Manitoba entities.

Element	Activity	Responsibility (options)	Possible roles for Manitoba public and private entities	Comments on Manitoba opportunities
Project development	Planning, engineering, financing, insurance	Proponent	Private entities could provide technical and other design support, financing and insurance, and project aggregation	Some Manitoba expertise in sequestration, also a significant financial and insurance sector
Project validation	Preparation of project documentation setting out proposed baseline, measurement and monitoring methodology	Proponent	Private and public entities could provide technical expertise and support: Public: standard methodologies Private: project-specific applications	Possible role for a centre of expertise based in Manitoba
	Review and validation of project documentation	Program authority or a designated entity	Private entities could become accredited to validate projects A federal or joint F/P/T entity could be responsible for validation of projects	Will depend on whether validation is done by program authority or accredited entities. Either could be Manitoba-based

Element	Activity	Responsibility (options)	Possible roles for Manitoba public and private entities	Comments on Manitoba opportunities
Monitoring, quantification and reporting	Monitor and quantify reductions/removals	Proponent	A national verification centre could develop and publish quantification protocols Private entities could provide monitoring services	Opportunities for public and private entities in Manitoba
	Prepare and submit reduction/removal reports	Proponent	Private entities could provide reporting services	Opportunities for private entities in Manitoba
Verification and certification of reductions/ removals	Verification of reductions/ removals (review of information provided by proponent, and may include audits)	Verification and certification is normally carried out by the same entity The program authority or designated entities could be responsible for verification/certification	Private entities could become accredited verifiers A federal or joint F/P/T entity could be responsible for verification of reductions/removals. Different verification centre could be established to address different project types	Engineering/ accounting firms are likely to have the most expertise If a government program authority is responsible, could be located in Manitoba
	Certification of reductions/ removals (a written statement that project has achieved reductions/removals as determined by verifier)			
Issuance of offset credits	Acceptance of verification report and final approval of reductions/ removals	These two steps are likely to be the responsibility of the program authority, but could conceivably be delegated to a designated non-government entity	Federal or joint F/P/T central program authority could be located in Manitoba	
	Issuance of offset credits			

Element	Activity	Responsibility (options)	Possible roles for Manitoba public and private entities	Comments on Manitoba opportunities
Registries	Registration of project and storage of project information	Offset project registry	Non-government or government registry (federal or F/P/T) could be located in Manitoba	All of these functions could be carried out by a single registry. If not, suitable linkages would be required Registry is likely to be almost entirely electronic – location should not be a critical factor
	Deposit and registration of offset credits for domestic compliance	Domestic compliance unit registry	Registry could be located in Manitoba	
	Tracking of ownership of domestic and international compliance units	National registry	Registry could be located in Manitoba	
Trading	Exchange of offsets credits for international and other domestic compliance units	Entity-to-entity transactions Federal authority would exchange offset credits for other domestic and international compliance units	Brokers and other facilitators A formal exchange may be viable if enough volume and liquidity	Short-term opportunities for brokers Longer-term opportunity to establish an exchange

Glossary[66]

Annex 1 Parties – Countries listed in Annex 1 to the United Nations Framework Convention on Climate Change that have ratified the Convention. These are mainly industrialized countries. Proposed emission limitation commitments for Annex 1 Parties to the Convention are specified in Annex B to the Kyoto Protocol. The commitments do not take effect unless the country ratifies the Kyoto Protocol and the Protocol enters into force. (See http://www.climatechange.gc.ca for more information on the Kyoto Protocol.)

Afforestation – Under the Kyoto Protocol, the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.

Assigned Amount Units (AAUs) – Under the Kyoto Protocol, each industrialized nation is allocated an "assigned amount" of GHG emissions for the 2008–2012 commitment period equal to its emissions limitation commitment. The total assigned amount is divided into units of one metric tonne of CO_2 equivalent. See Kyoto Compliance Units.

Avoided Emissions – Avoided emissions are reductions/removals that result from projects or activities that prevent emissions that would otherwise have occurred, particularly from new sources. Examples of projects or activities that avoid emissions include:

- activities to prevent deforestation, or prevent forest fires or disease; and
- construction of a state-of-the-art energy-efficient building instead of current standard practice.

Backstop/Covenant System – The Plan proposes that targets for emissions reductions—totalling 55 Mt CO_2e—be established for large final emitters through a backstop/covenant system. The covenant would be an agreement regarding emission reductions between a large final emitter and the federal government. The backstop will provide a "default" target for industry and cover such issues as compliance, reporting and verification. Companies will be given the option of remaining under the provisions of the backstop or entering into a covenant with the federal government. A large final emitter could meet its target under the backstop or a covenant in several ways—reduce its own emissions, purchase the emission reductions of other large final emitters in the form of domestic permits, purchase Kyoto compliance units, and/or purchase offset credits.

Baseline – The baseline for a project is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases or removals by sinks that would occur in the absence of the proposed project. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A of the Kyoto Protocol and removals by all ecosystem carbon pools within the project boundary.

- Project-Specific Baseline: Developed for a new project/project type.
- Standard Baseline: The baseline for a registered project will be used as a precedent for other projects of the same type. If adjustments are required to the standard baseline to meet the circumstances of the project, these adjustments must be justified.

Baseline Lifetime – The time period over which a baseline remains valid.

Boundary – The project boundary encompasses all anthropogenic emissions by sources and removals by sinks of greenhouse gases under the control of the project proponents that are significant and reasonably attributable to the project activity.

Business as Usual (BAU) – The activities, emissions or removals that would occur in the absence of the proposed offset project.

Carbon Pool – Reservoir or system which has the capacity to accumulate or release carbon, including the atmosphere. Under the Kyoto Protocol the following pools must be accounted for: above-ground biomass, below-ground biomass, litter, dead wood, and soil organic carbon.

Carbon Sequestration – The process of increasing the carbon stored in a carbon pool other than the atmosphere.

Carbon Stock – The absolute quantity of carbon held within a pool at a specified time, expressed in units of mass.

Certified Emission Reductions (CERs) – The credits issued for emission reductions or sink enhancements by a project under the Clean Development Mechanism (CDM). CERs can be used by an Annex I Party to help meet its commitment under the Kyoto Protocol. Each CER allows emissions of one metric tonne of CO_2 equivalent. See Kyoto Compliance Units.

Clean Development Mechanism (CDM) – A mechanism that allows emission reduction and afforestation/reforestation projects to be implemented in developing countries that have ratified the Kyoto Protocol. CDM projects earn Certified Emission Reductions for the emission reductions/removals achieved.

Commitment Period – A period for which the emissions limitation commitments apply under the Kyoto Protocol. The first commitment period is 2008 through 2012.

Compliance Units – Allowances, permits or credits that can be used for compliance with a domestic greenhouse gas emissions target as dictated by the federal government. Kyoto Compliance Units can be compliance units, but domestic allowances, permits and credits are not Kyoto Compliance Units.

Compliance Unit Registry – The registry where ownership of offset credits will be tracked. Each person or entity that owns offset credits will have an account in the registry, which lists the offset credits owned by that person or entity by serial number. A sale of an offset credit results in its transfer from the account of the seller to the account of the buyer. The Compliance Unit Registry could be the National Registry Canada is required to establish to track ownership of Kyoto Compliance Units held by Canadian persons and entities.

Conference of Parties – Meeting of the countries that have ratified the Framework Convention on Climate Change. Usually held once per year, the countries agree on actions to implement the provisions of the Convention.

Covered Emissions – The emissions by a large final emitter that are subject to its emission reduction requirement under the backstop/covenant system.

Crediting Period – The period for which an offset project may earn offset credits for emission reductions/removals achieved.

Cropland Management – Under the Kyoto Protocol it is the system of practices on land on which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production. Canada must decide by late 2006 whether it wishes to include this activity in its Kyoto Protocol accounting in the first commitment period.

Deforestation – The direct human-induced conversion of forested land to non-forested land.

Emissions – Greenhouse gas emissions, as stipulated in the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6).

Emissions Reduction – A decrease in emissions released into the atmosphere by a source (e.g., capture and flaring of landfill gas reduces methane emissions).

Emission Reduction Units (ERUs) – The credits issued for emission reductions or sink enhancements by a project under Joint Implementation (JI) as defined in Article 6 of the Kyoto Protocol. ERUs can be used by an Annex I Party to help meet its commitment under the Kyoto Protocol. Each ERU allows emissions of one metric tonne of CO_2 equivalent. See Kyoto Compliance Units.

Emissions Removal – A removal of greenhouse gases from the atmosphere (i.e., by sequestration).

Forest – Under the Kyoto Protocol a forest is a minimum area of land of 1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10–30 per cent with trees with the potential to reach a minimum height of 2–5 metres at maturity *in situ*. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10–30 per cent or tree height of 2–5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest. Canada has yet to make a decision on the two parameters for which a range is specified. Project developers should assume that an area would only be considered forest if it has minimum crown cover of 30 per cent and a minimum potential tree height of five metres.

Forest Management – Under the Kyoto Protocol, it is a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner. Canada must decide by late 2006 whether it wishes to include this activity in its Kyoto Protocol accounting in the first commitment period.

Forest Management Cap – The maximum amount of forest management Removal Units under Article 3.4 of the Kyoto Protocol that can be added to the Assigned Amount Units assigned to a country, after using the forest management sink to offset any net source from afforestation, reforestation and deforestation. (See www.climatechange.gc.ca for a discussion of Canada's Forest Management Cap.)

Global Warming Potential – An index describing the radiative characteristics of well-mixed greenhouse gases that represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere relative to that of carbon dioxide. The Conference of the Parties has adopted the Global Warming Potential values. (For GWP values for the first commitment period, see http://www.climatechange.gc.ca).

Grazing Land Management – Under the Kyoto Protocol, it is the system of practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced. Canada must decide by late 2006 whether it wishes to include this activity in its Kyoto Protocol accounting in the first commitment period.

Greenhouse Gases – Greenhouse gases are constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation. Greenhouse gas emissions covered by the emissions limitation commitments of the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6).

International Emissions Trading (IET) – Trading of Assigned Amount Units under Article 17 of the Kyoto Protocol.

Joint Implementation (JI) – A mechanism that allows emission reduction and removal projects to be implemented in countries that have ratified the Kyoto Protocol. A JI project can only be located in an Annex I Party with an emissions limitation commitment under the Kyoto Protocol. JI projects earn ERUs for the emission reductions/removals achieved.

Kyoto Compliance Units – Units recognized under the Kyoto Protocol as compliance units for national emission limitation commitments: Assigned Amount Units (AAUs), Emission Reduction Units (ERUs)

from the Joint Implementation Mechanism, Certified Emission Reductions (CERs) from the Clean Development Mechanism and Removal Units (RMUs).

Large Final Emitters – Entities in the thermal electricity, oil and gas, and manufacturing sectors.

Leakage – Leakage is an increase in emissions or reduction in removals outside a project's boundary (the boundary defined for the purposes of estimating the project's net GHG impact) resulting from the project's activities. Leakage is associated with changes in reductions/removals that are significant and reasonably attributable to the project, but are not under the control of the proponent.

National Registry – The accounting system which records national holdings of Kyoto compliance units (and national emissions) and through which Canada will demonstrate compliance with its Kyoto target.

National Inventory – The aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases for the gases and source categories covered by the Kyoto target during a specified year. (See http://www.climatechange.gc.ca for a list of the sources covered by Canada's national inventory.)

Non-Permanence – A condition (or event) related to the temporary nature and reversibility of greenhouse gas removals by sinks.

Marrakech Accords – Detailed rules for a number of the provisions of the Kyoto Protocol that were negotiated and adopted by Seventh Conference of the Parties to the United Nations Framework Convention on Climate Change in Marrakech, November 2001.

Monitoring – Periodic measurement of greenhouse gas emissions/removals.

Offset Credits – An offset credit is a compliance unit for the backstop/covenant system. Offset credits are awarded for net emission reductions or removals achieved by a registered offset project during 2008–2012 as certified through the offset review process.

Offset Review Process – The process used to determine that a proposed project meets the eligibility criteria and principles laid out in the legislative framework establishing the offset system. A proposed project that meets all of the requirements is registered as an offset project and is able to generate offset credits.

Offset Project Registry – The Offset Project Registry stores information related to individual offset projects:

- project documents and studies;
- information on baselines and measurement; and
- verification protocols and reports.

The Offset Project Registry will be used to track the project review from application to issuance of offset credits. The offset credits in the Compliance Unit Registry are linked to the project information in the Offset Project Registry by their serial numbers or other means.

Offset System – The offset system awards offset credits for verified emissions reduction or removals by eligible projects during the 2008–2012 commitment period. Participation is voluntary.

Party – A country that has ratified a particular international agreement such as the United Nations Framework Convention on Climate Change or the Kyoto Protocol.

Project – An activity undertaken by a proponent to reduce or remove emissions.

Project Boundary – The boundary that encompasses all anthropogenic emissions by sources and removals by sinks of greenhouse gases under the control of the project proponents that are significant and reasonably attributable to the project activity.

Project Document – A document prepared by the proponents describing a proposed project in sufficient detail to enable an assessment as to whether it should be registered as an offset project. The project

document must include a quantification protocol indicating how the net emission reductions or removals will be quantified.

Project Proponents – The active participants and investors in an offset project. The project proponents designate the owners of the resulting offset credits.

Quantification Protocol – The quantification protocol will provide detailed information on the baseline, boundary, leakage, monitoring, reporting and quantification of emission reductions/removals for a specific project/project type:

- Project-Specific Protocol: Developed for a new project/project type.
- Standard Protocol: The protocol for a registered project will be used as a precedent for other projects of the same type. If adjustments are required to the standard protocol to meet the circumstances of the project, these adjustments must be justified.

Reforestation – The direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on December 31, 1989.

Removal Units (RMUs) – The credits issued for net sink enhancements by eligible activities under Articles 3.3 and 3.4 of the Kyoto Protocol by an Annex I Party. RMUs can be used by an Annex I Party to help meet its commitment under the Kyoto Protocol. Each RMU allows emissions of one metric tonne of CO_2 equivalent. See Kyoto Compliance Units.

Re-vegetation – Under the Kyoto Protocol, it is a direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation. Canada must decide by late 2006 whether it wishes to include this activity in its Kyoto Protocol accounting in the first commitment period. It seems unlikely that Canada would include re-vegetation in its accounting as most land management activities could be captured under the definitions of forest, cropland or grazing land management.

Sequestration – The process of increasing the carbon in a carbon pool other than the atmosphere.

Sink – Any process, activity or mechanism which removes a greenhouse gas from the atmosphere.

Source – Any process or activity which releases a greenhouse gas into the atmosphere.

Targeted Measures – Targeted measures including information, incentives, regulation and tax measures that will achieve the national climate change objectives in specific sectors and program areas.

Appendix 1. Members of the Task Force on Emissions Trading and the Manitoba Economy

Lloyd Axworthy – Task Force Chair, Director and Chief Executive Officer, Liu Institute for Global Issues

Rob Altemeyer – MLA for Wolseley

Bob Brennan – President and Chief Executive Officer, Manitoba Hydro

Andrew Cowan – Environmental Coordinator, City of Winnipeg

Terry Duguid – Chairman, Manitoba Clean Environment Commission

Kerry Hawkins – President, Cargill Limited

Merrell-Ann Phare – Executive Director, Centre for Indigenous Environmental Resources

Bob Puchniak – Executive Vice President, Chief Financial Officer, James Richardson & Sons, Limited

David Runnalls – President and Chief Executive Officer, IISD

Marsha Sheppard – President, ECOMatters

Michael Spence – Mayor, City of Churchill

Ian Wishart – Executive Member, Keystone Agricultural Producers

Observers

Michael Fisher – Senior Business Officer, Western Economic Diversification Canada

Bryan Gray – Director, Climate Change Branch, Manitoba Energy, Science and Technology

Bill Hamlin – Strategic Issues Officer, Manitoba Hydro

Paul Vogt – Policy Secretary to Cabinet

Brian Yusishen – Director of Agri-Energy, Manitoba Energy, Science and Technology

Appendix 2. Expert Presentations to the Task Force on Emissions Trading and the Manitoba Economy

Current state of play

- International negotiations on climate change and emissions trading – *John Drexhage, IISD*
- Federal policy development – *Howard Brown, Natural Resources Canada*

Offset system

- Federal government briefing – *Mike Beale, Environment Canada*
- Agriculture issues – *Bob MacGregor, Agriculture and Agri-Food Canada*
- Forestry issues – *Brian McCloy of the Forest Products Association of Canada*
- Urban issues – *Louise Comeau, Federation of Canadian Municipalities (by telephone)*

Emissions trading

- *Michael J. Walsh* – Chicago Climate Exchange, Inc.
- *William Hill* – Winnipeg Commodity Exchange Inc.
- *Matthew Varilek* – NatSource, Washington, D.C.
- *Arman Glodjo* – Forexster Limited

Endnotes

1 From Inuit Observations on Climate Change – Final Report. International Institute for Sustainable Development, 2001.

2 Darren Ottaway, Town of Churchill. Presentation to the 2001 Manitoba Climate Change Task Force.

3 Mike Goodyear, Churchill Northern Study Centre. Presentation to the 2001 Manitoba Climate Change Task Force.

4 *Ibid*.

5 Projections summarized from the Canadian Climate Impacts Scenarios (CCIS) project Internet site for central Manitoba for the 2080s, IS92a scenario – "business-as-usual." University of Victoria, Victoria, B.C., Canada <http://www.cics.uvic.ca/scenarios/>.

6 Report from the United Kingdom's Hadley Centre for Climate Prediction. Stabilisation and commitment to future climate change, October 2002. Department for Environment, Food and Rural Affairs.

7 Based on current projections of our business-as-usual emissions in 2010, the six per cent reduction amounts to 240 million tonnes (Mt) of CO_2 equivalent.

8 See "Ethanol Made in Manitoba, A report by the Ethanol Advisory panel of the Government of Manitoba," Winnipeg, 2002.

9 A cost-sharing mechanism could be employed for offset projects that are demonstrated to contribute to adaptation, and where the adaptation benefits are desirable irrespective of the offset co-benefit. The cost-sharing approach creates a market incentive for emitters to purchase offset credits from adaptation projects; essentially the private entity reduces the public cost of the adaptation project, while the public sector reduces the emissions offset cost for the private entity. This approach would be feasible where the offset project contributes to an adaptation measure supported by government policy and local stakeholders. This would also represent a direct subsidy for a certain type of offset project, but, if done correctly, would reduce the total cost of climate change to the economy.

10 The economic downturn in Russia has resulted in their national emissions being much lower than the target that was negotiated, making a large number of credits available to sell into the market.

11 Capros, P. og Mantzos, L. (2000), The Economic Effects of EU-Wide Industry-Level Emission Trading to Reduce Greenhouse Gases, Results from PRIMES Energy Systems Model, E3M Lab, National Technical University of Athens.

12 Government of Canada. *Offset System Discussion Paper* 2003, http://climatechange.gc.ca/english/publications/offsets/cover.html

13 *Ibid*., Table 1, page 26.

14 Agriculture and Agri-Food Climate Change Table, *Options Report: Reducing Greenhouse Gas Emissions from Canadian Agriculture* (2000)

15 Personal communication. Energy Development Initiative, Manitoba Energy, Science and Technology, October 8, 2003.

16 Pape-Salmon, A., J. Dogterom, C. Wieler, M. Anielski 2003. *Low-impact renewable energy policy in Canada: Strengths, gaps and a path forward*. Pembina Institute for Appropriate Development.

17 http://winnipeg.cbc.ca/regional/servlet/View?filename=mb_lakelevels20030617

18 http://www.c-ciarn.ca/index_e.asp

19 http://www.ouranos.ca/intro/intro_e.html

20 *Climate Change Plan for Canada* 2002, pp. 11.

21 Based on the draft Environment Canada presentation modules on CDM and JI. Prepared by the International Institute for Sustainable Development.

22 This is an index scale with 1990 at 100. EU emissions in 2000 were already at 96.

23 Capros, P. og Mantzos, L. (2000), The Economic Effects of EU-Wide Industry-Level Emission Trading to Reduce Greenhouse Gases, Results from PRIMES energy Systems Model, E3M Lab, National Technical University of Athens.

24 "Greenhouse Gas Markets – August 2003", Evolution Markets LLC., http://www.evomarkets.com/assets/mmu/mmu_ghg_aug_03.pdf

25 A brief explanation of why offsets don't help Canada meet its Kyoto target – offsets just increase the supply of domestic compliance units. Two possible outcomes:

(1) LFEs buy offsets, and increase emissions correspondingly. If offset credits are not the result of reductions/removals elsewhere in the economy that are 100 per cent incremental to BAU, then total national emissions increase and Canada must buy more international credits.

(2) Offset credits are exchanged for AAUs and exported. This means Canada has fewer AAUs. If offset credits are not the result of reductions/removals elsewhere in the economy that are 100 per cent incremental to BAU, then the gap has widened and Canada must buy more international units.

26 http://www.agr.gc.ca/env/greencover-verdir/index_e.phtml

27 http://www.climatechange.gc.ca/english/publications/announcement/bg_governments.html

28 http://www.climatechange.gc.ca/english/publications/announcement/bg_governments.html

29 See supporting information for Recommendation #9.

30 http://www.chicagoclimateexchange.com/

31 Personal communication with Mike Walsh, senior vice president, Chicago Climate Exchange, September 23, 2003.

32 Tradeable Permits Working Group, "Using Tradeable Emission Permits to Help Achieve Domestic Greenhouse Gas Objectives," National Climate Change Process, April 2000.

33 Materials on the economic analysis presented to stakeholders are available at: http://nccp.ca/NCCP/national_stakeholders/amg_e.html

34 Pizer, William A., "Choosing Price or Quantity Controls for Greenhouse Gases," Resources for the Future Issue Brief #17, July 1999.

35 Information derived from EPA Web site: http://www.epa.gov/airmarkets/auctions/factsheet.html

36 Canada's actual Kyoto target is six per cent below 1990 emissions levels. Based on current projections for 2010, this would amount to 240 Mt CO_2 equivalent.

37 News release from the Government of Canada, December 18, 2002.

38 June 2003 Offset System Discussion Paper, Government of Canada, pp 2.

39 Afforestation – direct human-induced conversion of land that has not been forested for a period of 50 years to forested land through planting or seeding.

40 Reforestation – direct human-induced conversion of non-forested land to forested land through planting or seeding, on land that was forested.

41 Deforestation – direct human-inducted conversions of forested land to non-forested land.

42 Forest management – system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biodiversity), economic and social functions of the forest in a sustainable manner.

43 Cropland management – land practices for which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production.

44 Grazing land management – practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced.

45 Estimated at 240 Mt CO_2 equivalent from Canada's projected business-as-usual emissions level in 2010.

46 From enteric fermentation and manure management. Source: Environment Canada, *1990–2001 GHG Emission Estimates for Manitoba.*

47 Wittenberg, Karen and Boadi, Dinah, *Reducing Greenhouse Gas Emissions from Livestock Agriculture in Manitoba*, paper produced for the Manitoba Climate Change Taskforce (2001).

48 Quoted by the U.S. Environmental Protection Agency on its "Inside the Greenhouse" Web pages. See www.epa.gov/globalwarming/greenhouse/greenhouse8/exploring.html

49 Environment Canada, 1990–2001 GHG Emission Estimates for Manitoba (2003) http:/www.ec.gc.ca/pdb/ghg/manitoba_2001_e.cfm

50 Wittenberg and Boadi, 2001.

51 *Ibid*.

52 *Ibid*.

53 Canadian Pork Council, *Greenhouse Gas Mitigation Strategy for the Canadian Hog Industry* (2002).

54 Environment Canada, 2003.

55 Wittenberg and Boadi, 2001.

56 G.M. Luciuk, M.A. Bonneau, D.M. Boyle and E. Viberg, *Carbon Sequestration – Additional Environmental Benefits of Forages in the PFRA Permanent Cover Program*, Agriculture and Agri-Food Canada.

57 Agriculture and Agri-Food Canada, *The Health of Our Air: Toward Sustainable Agriculture in Canada* (1999).

58 *Ibid*.

59 Agriculture and Agri-Food Climate Change Table. *Options Report: Reducing Greenhouse Gas Emissions from Canadian Agriculture*, 2000.

60 Sinks Table, Options Paper: Land-Use, Land-Use Change and Forestry in Canada and the Kyoto Protocol (1999).

61 Nawitka Renewable Resource Consultants, Victoria, BC: *Carbon Sequestration Aspects of an Afforestation Program in Canada's Prairie Provinces*, March 1999.

62 Non-agricultural land was assumed to be unsuitable for afforestation, as was farm land under crops or in summerfallow.

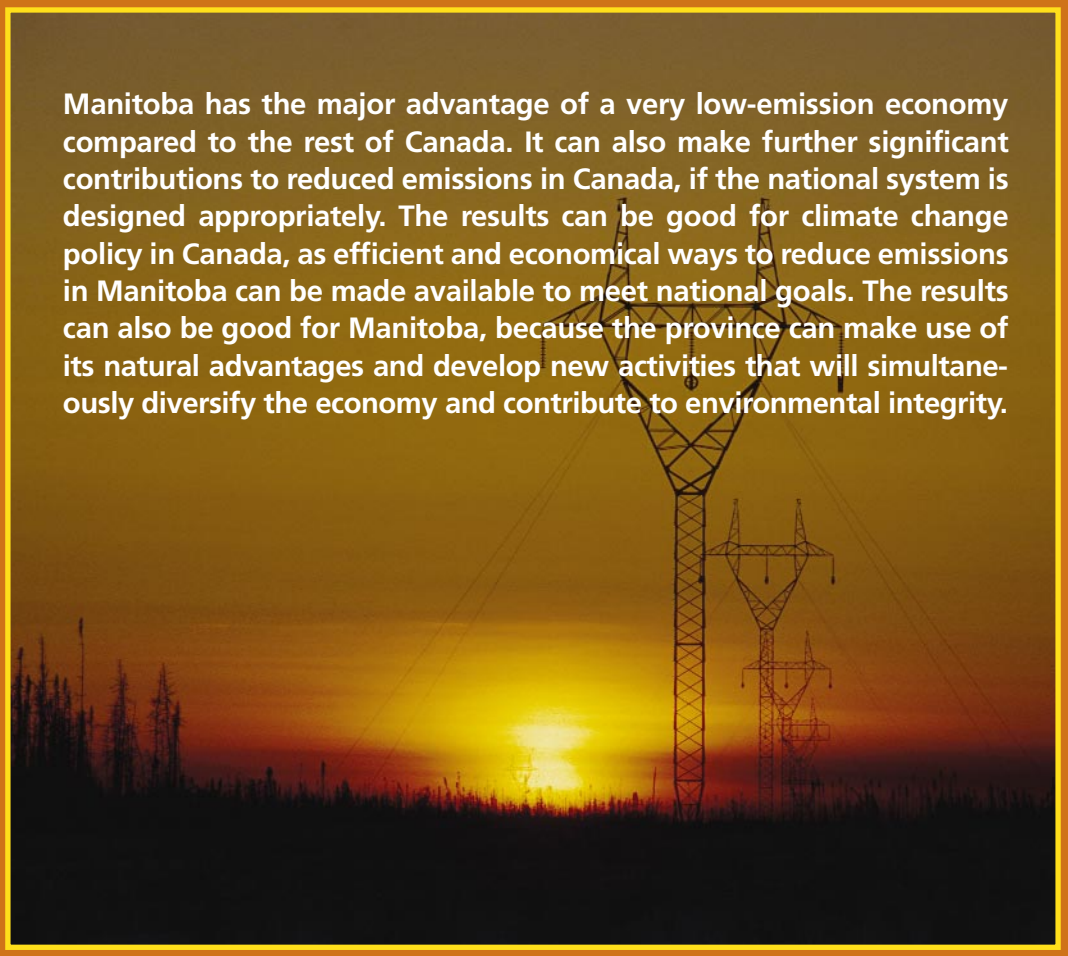
63 Brian McCloy, Forest Products Association of Canada. Technical paper prepared for the task force.

64 Offset System Discussion Paper, June 2003.

65 For the purposes of this paper, domestic compliance units are assumed to include allowances (or permits) allocated to LFEs and credits generated through the offset system.

66 From the June 2003 Offset System Discussion Paper. Government of Canada.

Realizing Opportunities: Emissions Trading in Manitoba



Manitoba has the major advantage of a very low-emission economy compared to the rest of Canada. It can also make further significant contributions to reduced emissions in Canada, if the national system is designed appropriately. The results can be good for climate change policy in Canada, as efficient and economical ways to reduce emissions in Manitoba can be made available to meet national goals. The results can also be good for Manitoba, because the province can make use of its natural advantages and develop new activities that will simultaneously diversify the economy and contribute to environmental integrity.