

2006



Report of the
**Commissioner of the
Environment and
Sustainable Development**
to the House of Commons

**The Commissioner's Perspective—2006
Climate Change—An Overview
Main Points—Chapters 1 to 5**



Office of the Auditor General of Canada

The 2006 Report of the Commissioner of the Environment and Sustainable Development comprises five chapters, The Commissioner's Perspective—2006, Climate Change—An Overview, and Main Points. The main table of contents is found at the end of this publication.

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For copies of this report or other Office of the Auditor General publications, contact

Office of the Auditor General of Canada
240 Sparks Street, Stop 10-1
Ottawa, Ontario
K1A 0G6

Telephone: 613-952-0213, ext. 5000, or 1-888-761-5953 (toll-free)
Fax: 613-943-5485
Hearing impaired only TTY: 1-613-954-8042
E-mail: distribution@oag-bvg.gc.ca

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Commissioner of the Environment and Sustainable Development of Canada
Commissaire à l'environnement et au développement durable du Canada

Office of the Auditor General of Canada • Bureau du vérificateur général du Canada

To the Honourable Speaker of the House of Commons:

On behalf of the Auditor General of Canada, I have the honour to transmit herewith my Report to the House of Commons for 2006, which is to be laid before the House in accordance with the provisions of section 23(3) of the *Auditor General Act*.

A handwritten signature in black ink that reads "Johanne Gélinas".

Johanne Gélinas
Commissioner of the Environment
and Sustainable Development

OTTAWA, 28 September 2006

To the reader:

I welcome your comments and suggestions on this Report and other issues related to the environment and sustainable development. I can be reached at the following address:

Johanne G  linas
Commissioner of the Environment and Sustainable Development
240 Sparks Street
Ottawa, Ontario
K1A 0G6

For general questions or comments, please contact Communications at 613-995-3708 or 1-888-761-5953 (toll free).

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The Commissioner's Perspective

Introduction—Climate Change is Upon Us



Johanne Gélinas
Commissioner of the Environment
and Sustainable Development

All Canadians have a stake

The Earth is warming, triggering dramatic changes in climate and weather systems around the world. Climate scientists overwhelmingly agree that carbon dioxide and other “greenhouse gases” released by human activities are generally to blame. Climate change is a global problem with global consequences: The implications are profound. Experts say we need to act quickly and effectively. I believe this is the prudent thing to do.

Canada both suffers from the consequences and is a source of the problem. The impacts are already being felt from coast to coast to coast and in almost every region and in many sectors of the economy. Hundreds of communities depend on natural resource sectors that are sensitive to climate change, such as agriculture, fisheries, and forestry. The impacts are expected to worsen and could include

- the spread of pests and diseases,
- drought in the prairies,
- melting permafrost and destabilized infrastructure in the North,
- rising sea levels and more intense storms on the coasts, and
- more days of extreme heat and smog in large urban centres.

The effects may be worse in other countries, especially in nations with the least capacity to cope. Canada and the world will feel the repercussions of climate change for generations to come.

Relatively speaking, Canada is a major source of greenhouse gas emissions that contribute to climate change. Per capita, Canadians are among the highest emitters in the world. Since producing and consuming energy from fossil fuels accounts for 80 percent of man-made greenhouse gas emissions, experts suggest long-term solutions involve changing to low-carbon economy and energy systems.

As we are an energy-producing and dependent country, climate change goes to the heart of our economy and touches many aspects of our lives, threatening economic costs. It also presents opportunities. For example, developing and deploying new technology will play a key role in building a healthier and more sustainable future. Canadians will

Did you know?

Carbon dioxide can remain in the atmosphere for up to 200 years, which means that stabilizing carbon dioxide emissions at current levels will not immediately stabilize atmospheric concentrations.

have the opportunity to contribute and compete at home and globally. No matter how you look at the situation, the stakes are high for Canada. However, the impact, costs, and benefits of climate change will not be felt or shared equally by all Canadians—there will be economic, social, and environmental winners and losers.

Our findings are crucial to all Canadians

Canadians are aware of and are worried about climate change.

The federal government plays a crucial role in addressing climate change on the home and international fronts. Its efforts span numerous federal departments and agencies and cover dozens of programs designed to understand, mitigate, and adapt to climate change. Its actions matter, and its successes and failures have consequences. For these reasons, I decided 18 months ago to devote my 2006 report to auditing and monitoring aspects of the government's approach to climate change (Exhibit 1).

This is not the first time we have audited the topic (Exhibit 2). The response to weaknesses we identified in the past has been disappointing. On the basis of this year's work, I am more troubled than ever by the federal government's long-standing failure to confront one of the greatest challenges of our time. Our future is at stake.

This year's audits started with one government in power and ended in June before the current government had decided the approach it would take to address climate change. This does not affect our findings. Our work is non-partisan and fact-based, and deals with how the government implements its policy choices. Climate change is here to stay, and ours is a message to past, current, and future governments of Canada.

In the following pages, I provide a snapshot of our key audit findings by answering three seemingly simple questions:

- Is Canada on track to meet its emission reduction obligations?
- Is Canada ready to adapt to the impact of climate change?
- Is the government organized and managing well?

Then I reflect on what the government needs to do in areas of energy development, planning, science, and adaptation; governance; and, most importantly, leadership. This year, I have included **Climate Change—An Overview** with my Perspective (see page 23).

The Overview describes climate change, what can be done about it, and Canada's international and domestic commitments.

Exhibit 1 An overview of this year's report**Chapter 1**

- Governance and accountability regarding a management framework for climate change initiatives
- Monitoring of systems that track spending on climate change initiatives and reporting on spending
- Targets and policy tools for transportation and large industrial emitters
- Two new mechanisms for reducing greenhouse gas emissions:
 - a domestic system to trade in greenhouse gas emissions, and
 - Sustainable Development Technology Canada's climate change activities

Chapter 2

- An assessment of federal progress toward a strategy to help Canadians adapt to a changing climate (assessment of vulnerabilities to potential impacts of a changing climate, identification of priorities, and development of action plans)
- Work on climate change adaptation in six departments (with responsibilities for sectors or regions likely to be affected by climate change)
- Development and provision of information in three areas: research on impacts and adaptation, climate monitoring (to assess impacts and support adaptation), and regional climate modelling

Chapter 3

- A look in detail at three NRCan programs that each received \$100 million or more in federal funding earmarked for climate change programs:
 - the Wind Power Production Incentive,
 - the EnerGuide for Existing Houses, and
 - the Ethanol Expansion Program
- An examination of the amount of greenhouse gas emission reductions the three programs have achieved, what they have cost, and how the Department monitors and reports on program results and spending
- An assessment of the extent to which NRCan has learned from the experience, and the extent to which it has taken steps to reduce risks in managing its programs
- A broad look at other emission reduction efforts in the oil and gas sector and the areas of wind power and home energy efficiency to see whether NRCan can demonstrate what its programs and other activities have contributed to emission reductions targeted in the government's plans for addressing climate change

Chapter 4

- A report on the progress departments have made in meeting their sustainable development strategy commitments—specifically, the progress of 21 departments and agencies in implementing 39 commitments from their sustainable development strategies, including those addressing climate change

Chapter 5

- The annual report to Parliament on the environmental petitions process as required by the *Auditor General Act*, and new petitions received between 1 July 2005 and 30 June 2006
- An audit of the federal government's response to a petition concerning the purchase of green power—power derived from low-impact renewable sources of energy, such as wind; and an assessment of actions taken by Environment Canada, Natural Resources Canada, and Public Works and Government Services Canada on the Purchase of Electricity from Renewable Resources Program, which aims to purchase green power and help develop markets for green power

Exhibit 2 Findings from past audits

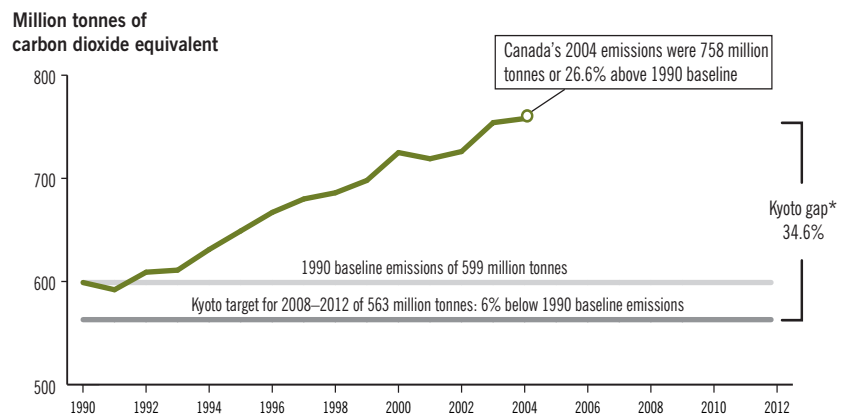
- In 1998, we audited Canada's climate change implementation strategy and cited poor planning and ineffective management as the root cause behind Canada's failure at that time to meet its commitments. We recommended that the federal government take the lead, in collaboration with other levels of government and major stakeholders, in a determined national effort.
- In our follow-up audit in Chapter 6 of the Commissioner's 2001 Report, we noted progress in developing a management structure for climate change, but none in providing comprehensive information to Parliament. We noted that the federal government needed to continue to clarify federal roles and responsibilities, develop a broader portfolio of measures to meet Canada's climate change commitments, and provide more detailed information to Parliament.

Looking Back—Too Little, Too Slow

Canada is not on track to meet its obligations to reduce emissions

Under the Kyoto Protocol, Canada agreed to reduce its emission levels in 2008–12 to 6 percent below those in 1990. The government's own 2004 data revealed that our greenhouse gas emissions were almost 27 percent above 1990 levels and were rising, not declining (Exhibit 3). To many, this is not news. Indeed, it has been widely reported by the government itself. So what is going wrong? Our audits identified several reasons why Canada is not on track to meet the Kyoto targets.

Exhibit 3 The gap between Canada's greenhouse gas emissions and its Kyoto target is growing



* Mathematical procedures for calculating the gap do not involve adding the percentages. In addition, percentages have been calculated using the original unrounded numbers.

Source: Adapted from Environment Canada's *National Inventory Report 1990–2004: Greenhouse Gas Sources and Sinks in Canada* (April 2006)

The government has launched several programs that our audits found were reducing greenhouse gas emissions or were poised to reduce emissions in the future. Yet, it has struggled to put in place other key initiatives—most notably, the pivotal Large Final Emitter System and the system for domestic emissions trading. The systems' development has been slow, and many elements critical to their success remain unresolved.

Did You Know?

The federal government has been in discussion with industry and other stakeholders on the design of the Large Final Emitter System since 2002.

Even if the measures contained in the previous government's 2005 plan had been fully implemented, it is difficult to say whether the projected emission reductions would have been enough to meet our Kyoto obligations. In the fullness of time, some measures may have contributed. Yet, in certain sectors, the measures are not up to the task of meeting the Kyoto obligations. For example, the transportation and industry sectors account for the majority of Canada's emissions—78 percent—but emission reduction measures we examined are not expected to bring emissions below 1990 levels. At best, they might only slow the rate of growth. Given Canada's strong economic growth, especially in energy production, meeting our Kyoto target would arguably have been a challenge even if bolder action had been taken earlier.

Ever-shifting responsibilities between federal departments and ministers, turnover of key personnel, and changes from plan to plan (Exhibit 4) have caused delays and a loss of momentum. The government's weak handling of the many transitions that took place over the history of this file has hampered progress.

Lastly, the federal government does not act alone. It has faced—and still faces—considerable challenges in bringing various players onside and in mobilizing concerted action. Achieving success on a problem as pervasive as climate change demands that all levels of government, industry and business groups, science, academia, and civil society organizations collaborate. The reality to date is that some players have been unwilling to do so. Deep divisions and conflicts remain.

Exhibit 4 Three federal plans for addressing climate change

Action Plan 2000 (October 2000)	Climate Change Plan for Canada (November 2002)	Project Green (April 2005)
This plan set out a package of initiatives to take Canada one third of the way to its Kyoto target. It aimed at key sectors and included initiatives in areas such as transportation, energy, and buildings.	This plan's goals were to help Canadians become efficient energy producers and consumers. The 2002 plan promoted Canadian leadership in developing new and cleaner technologies, and identified a broad range of actions based on the earlier 2000 plan.	This plan built on the two previous plans. Its goals were to help mobilize Canadians around Canada's Kyoto commitments, and help transform the economy while maintaining our competitiveness.

Canada is not adequately prepared to adapt to the effects of climate change

Some effects of climate change are inevitable. Yet, the level of attention paid to adaptation pales in comparison with the attention paid to reducing emissions, despite the fact that, in the 1992 United Nations Framework Convention on Climate Change, the government committed to work on both fronts.

The federal government has no overall adaptation plan, and key elements of an effective approach have still to be put in place. Little work has been done to assess how adaptation will affect federal policies and programs. Work on a national adaptation framework (in partnership with the provinces), a federal adaptation strategy, and a climate change science plan for Canada began in earnest, made some progress, and then stalled.

Science and research are the foundation for understanding changes in climatic systems and their impact, and for understanding where we are vulnerable and what we must do to adapt. While investments by the government have built knowledge, significant information gaps still exist. The government has not effectively mobilized and organized its scientific and research activities to ensure that decision makers get the information they need.

The federal government's efforts are not well organized and not well managed

Our audits identified weaknesses in the government-wide system of accountability for climate change. Co-ordinating committees and mechanisms that once existed have been phased out and have not been replaced. A lack of central ownership, clearly defined departmental responsibilities, integrated strategies, and ongoing evaluation systems all point to problems in the government's management of the climate change initiative.

Since 1997, the government has announced over \$6 billion in funding for initiatives on climate change. However, it does not yet have an effective government-wide system to track expenditures, performance, and results on its climate change programs. As a result, the government does not have the necessary tools for effective management, nor can it provide Parliamentarians with an accurate government-wide picture on spending and results they have requested.

On the whole, the government's response to climate change is not a good story. At a government-wide level, our audits revealed inadequate leadership, planning, and performance. To date, the approach has lacked foresight and direction and has created confusion

Did You Know?

The Government of Canada has not released a comprehensive report on climate change expenditures or results since 2003. The next comprehensive report is not expected until 2008.

Canada is not the only industrialized country having difficulty addressing climate change.

Factors such as

- economic growth,
- increased use of transportation,
- the structure of energy production, and
- changes in population and climate

have all impacted countries' ability to reduce emissions.

Did You Know?

A Government of Canada database lists 200 projects on impacts and adaptation research related to climate change.

and uncertainty for those trying to deal with it. Many of the weaknesses identified in our audits are of the government's own making. It has not been effective in leading and deciding on many of the key areas under its control. Change is needed.

The government has a foundation to build on

I do want to emphasize that a foundation is in place and that it is important to build on it. As noted earlier, our audits identified several positive programs and practices that have either already reduced emissions or hold promise to do so.

Pockets of federal research and support to research networks have helped to gather knowledge on Canada's vulnerability to climate change in areas such as health, coastal zones, fisheries, forests, water resources, and agriculture. Important partnerships have been established. Departments and central agencies are taking steps to organize all federal programs on climate change in a logical way and are developing government-wide tracking and reporting systems. As a result, some foundational learning has taken place and expertise has been built.

There are motivated and talented people in the federal public service. During our audits, we met countless knowledgeable and creative public servants—scientists, program managers, and policy-makers alike—who are committed to success.

Looking Forward—a Massive Scale Up of Efforts is Needed

Canada is at a historic juncture in its climate change file. The current government says it wants to significantly improve the poor track record to date. To do so, it must take immediate and long-lasting action on many fronts. The direction it sets and actions it takes will affect many generations of Canadians. Even though difficult choices and decisions lie ahead, I am optimistic that the government can meet the challenge. In the following pages, I identify five areas that I believe are crucial and where the office will focus its future audit efforts:

- leadership,
- energy and climate change,
- reducing greenhouse gas emissions,
- adaptation, and
- governance and accountability.

Each area is important but the call for leadership applies to them all.

Provide sustained leadership

Successfully confronting the economic, social, and environmental risks and the opportunities posed by climate change requires unprecedented leadership from the highest levels of government, Parliament, and the public service. Transformational change cannot be driven solely from the bottom up. Rather, it requires bold, decisive top-down leadership. Once direction is set, sustained efforts are needed to ensure that it is fully implemented.

Although the federal government has ultimate responsibility for making and meeting international commitments on climate change (such as those included in the Kyoto Protocol), it does not and cannot act alone. It must lead to establish and, in some cases, rebuild strong and long-lasting partnerships with other levels of government, industry, communities, non-government organizations, academia, and others.

Integrate energy and climate change

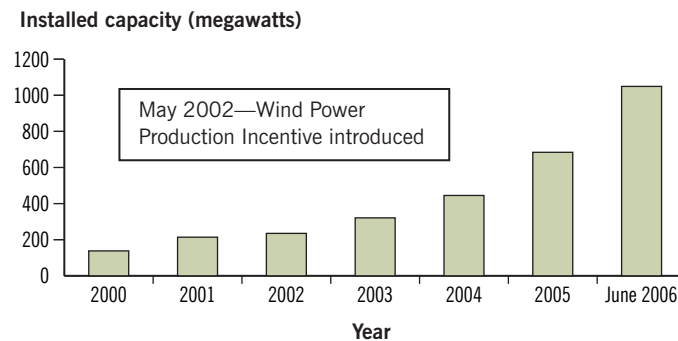
The government cannot effectively address climate change without considering changes in the way Canadians produce, distribute, and consume energy. And we cannot secure our energy future without considering climate change—these issues are unavoidably linked. Any new approach must confront this reality.

First and foremost, the government needs to clearly state how it intends to reconcile the need to reduce greenhouse gas emissions against expected growth in the oil and gas sector. And Canada's oil and gas industry is booming. Greenhouse gas emissions in the oil and gas sector have increased over 50 percent since 1990. Emissions from expanded Western oil sands operations could double between 2004 and 2015. This increase in production could counter efforts to reduce emissions in other areas of society unless options such as new technology are developed and put into widespread use.

Did You Know?

- In 2004, Canada exported two and a half times more oil and gas than it did in 1990.
- Oil and gas represent over 90 percent of Canada's energy exports.
- Canada has been the largest foreign supplier of crude oil to the United States for seven consecutive years, from 1999 to 2005.
- Since 1990, over 28 percent of the increase in Canada's total greenhouse gas emissions is attributable to exports of oil and gas.

The federal government also needs to define how and to what extent it will support energy conservation and efficiency; and alternative sources of energy, including wind, solar, biomass, and others. The government is already supporting the diversification of energy in selected sectors. We found, for example, that the federally funded Wind Power Production Incentive stimulated investment in wind energy (Exhibit 5). Yet this program is operating in the absence of overall direction for the wind sector. Indeed, government support to various alternative sources of energy is occurring in the absence of an overall direction for energy development in Canada.

Exhibit 5 Total installed wind power capacity in Canada is growing

Source: Based on information provided by the Canadian Wind Energy Association

Develop a plan to reduce greenhouse gas emissions

The government urgently needs a believable, clear, and realistic plan to significantly reduce greenhouse gas emissions. It must establish and commit to short- and long-term national goals: a short-term focus to maintain priority, urgency, and momentum and a long-term one to provide the certainty that supports capital investments that will last for decades. The current government has announced that Canada cannot realistically meet its Kyoto target. If so, then new targets should take its place. In this vein, the government must make a concerted effort to slow the rate of growth of greenhouse gas emissions, ensure that emissions reach their peak as soon as possible, and then achieve substantial reductions in absolute levels of emissions.

There are no magic formulas or quick fixes, however. To achieve success, the government must use a mix of tools and measures, including regulations, financial incentives, market-based emission trading mechanisms (linked to global ones), technology development and deployment, investments in infrastructure, public education, and others. The measures it takes should

- rest on solid economic, environmental, and social analyses;
- tackle major sources of greenhouse gas emissions in every sector and focus efforts on the highest priorities;
- have clear, numerical targets to reduce emissions; and
- ensure that the different programs capitalize on departmental strengths and areas of expertise and complement one another to form a cohesive whole.

The climate change plan needs to fit into a broader federal plan for the environment and sustainable development (Exhibit 6).

Exhibit 6 Action on climate change should be linked to a broader environment and sustainable development plan

The federal government has many environment and sustainable development responsibilities and initiatives, among which climate change is particularly important. But, as I have reported in past years, the government has no overall plan to explain to parliamentarians and Canadians its environment and sustainable development goals and how they will be reached. My reports, and those of two parliamentary committees, have called on the government to develop such an overall sustainable development strategy. A commitment to act on the recommendations was made by the Privy Council Office, but not carried out.

Such a strategy would be a means to do the following:

- Educate Canadians on the environment and sustainable development challenges and opportunities facing Canada in the coming decades
 - Provide a clear, compelling vision of the sustainable Canada that the federal government seeks
 - Set out the government's key priorities
 - Better explain individual initiatives by linking these to the vision and priorities
 - Identify the targets and indicators by which the government will demonstrate results
 - Help ensure coherence among the individual departmental sustainable development strategies
-

Push ahead with adaptation

Adaptation is fundamentally about protecting the economic and social well-being of Canadians, by helping to improve their ability to cope with a changing climate. There is a compelling case for government action and yet, it has been neglected in efforts to date. Instead of being an afterthought, it should be a prominent part of government plans. Failing to adequately invest in this area will undermine Canada's ability to make wise decisions.

While there are knowledge gaps, they are not the real obstacle; enough has been learned for adaptation to proceed. The government must better prepare for the impacts of climate change on federal programs, the economy, and society. It should

- examine how climate change will affect individual federal programs and departments and make the required modifications,
- develop an action plan that cuts across all departments,
- work with other levels of government to develop clear priorities, and
- find new ways to connect researchers with decision makers.

Assure governance and accountability

Planning, management, and performance go hand in hand. A good plan is important, but so is taking action and assuring results. Effective governance and accountability are fundamental in all policy areas and are especially crucial elements of complex, horizontal, long-term files like climate change. Our audits show that the government's approach to climate change needs to pay much more attention to

- establishing clear roles, responsibilities, and authority for all federal departments and agencies;
- designing and putting in place mechanisms to co-ordinate federal activities across departments and agencies;
- tracking expenditures and performance against agreed-upon targets and reporting this information to Parliament and Canadians; and
- monitoring, on an ongoing basis, the performance of all programs, to learn what works and to retain and improve the programs that provide cost-effective, clear results.

The Treasury Board Secretariat, the Privy Council Office, and the Department of Finance must play a strong role.

A Final Word—Finding Lasting Solutions

The government's response to climate change will be a critical test of its commitment to sustainable development. Reducing our greenhouse gas emissions and adapting to present and future effects of climate change are challenging tasks. It is a long-term journey, and there may be blind alleys and false starts along the way. Canadians should be able to expect their federal government to stay the course until lasting solutions are found. It is in our own best interest.

The government accepted all of the recommendations we made in the following chapters. The government has indicated that it is working on a new plan to address climate change and thus did not provide detailed responses to all of the recommendations. In the new plan, I expect the government to provide a description of how it has taken our recommendations into account, and to so inform Parliament and the Canadian public.

Appendix Auditor General Act—Excerpts

An Act respecting the Office of the Auditor General of Canada and sustainable development monitoring and reporting

INTERPRETATION

Definitions	2. In this Act,
“appropriate Minister”	“appropriate Minister” has the meaning assigned by section 2 of the <i>Financial Administration Act</i> ;
	...
“category I department”	“category I department” means <ul style="list-style-type: none"> (a) any department named in Schedule I to the <i>Financial Administration Act</i>, (b) any department in respect of which a direction has been made under subsection 24(3), and (c) any department, set out in the schedule;
“Commissioner”	“Commissioner” means the Commissioner of the Environment and Sustainable Development appointed under subsection 15.1(1);
	...
“sustainable development”	“sustainable development” means development that meets the needs of the present without compromising the ability of future generations to meet their own needs;
“sustainable development strategy”	“sustainable development strategy”, with respect to a category I department, means the department’s objectives, and plans of action, to further sustainable development.

DUTIES

Examination	5. The Auditor General is the auditor of the accounts of Canada, including those relating to the Consolidated Revenue Fund and as such shall make such examinations and inquiries as he considers necessary to enable him to report as required by this Act;
Annual and additional reports to the House of Commons	7. (1) The Auditor General shall report annually to the House of Commons and may make, in addition to any special report made under subsection 8(1) or 19(2) and the Commissioner’s report under subsection 23(2), not more than three additional reports in any year to the House of Commons <ul style="list-style-type: none"> (a) on the work of his office; and, (b) on whether, in carrying on the work of his office, he received all the information and explanations he required.

Idem

(2) Each report of the Auditor General under subsection (1) shall call attention to any thing that he considers to be of significance and of a nature that should be brought to the attention of the House of Commons, including any cases in which he has observed that

- (a) accounts have not been faithfully and properly maintained or public money has not been fully accounted for or paid, where so required by law, into the Consolidated Revenue Fund;
- (b) essential records have not been maintained or the rules and procedures applied have been insufficient to safeguard and control public property, to secure an effective check on the assessment, collection and proper allocation of the revenue and to ensure that expenditures have been made only as authorized;
- (c) money has been expended other than for purposes for which it was appropriated by Parliament;
- (d) money has been expended without due regard to economy or efficiency;
- (e) satisfactory procedures have not been established to measure and report the effectiveness of programs, where such procedures could appropriately and reasonably be implemented; or
- (f) money has been expended without due regard to the environmental effects of those expenditures in the context of sustainable development.

STAFF OF THE AUDITOR GENERAL**Appointment of Commissioner**

15.1 (1) The Auditor General shall, in accordance with the *Public Service Employment Act*, appoint a senior officer to be called the Commissioner of the Environment and Sustainable Development who shall report directly to the Auditor General.

Commissioner's duties

(2) The Commissioner shall assist the Auditor General in performing the duties of the Auditor General set out in this Act that relate to the environment and sustainable development.

SUSTAINABLE DEVELOPMENT**Purpose**

21.1 The purpose of the Commissioner is to provide sustainable development monitoring and reporting on the progress of category I departments towards sustainable development, which is a continually evolving concept based on the integration of social, economic and environmental concerns, and which may be achieved by, among other things,

- (a) the integration of the environment and the economy;
- (b) protecting the health of Canadians;
- (c) protecting ecosystems;
- (d) meeting international obligations;

- (e) promoting equity;
- (f) an integrated approach to planning and making decisions that takes into account the environmental and natural resource costs of different economic options and the economic costs of different environmental and natural resource options;
- (g) preventing pollution; and
- (h) respect for nature and the needs of future generations.

Petitions received 22. (1) Where the Auditor General receives a petition in writing from a resident of Canada about an environmental matter in the context of sustainable development that is the responsibility of a category I department, the Auditor General shall make a record of the petition and forward the petition within fifteen days after the day on which it is received to the appropriate Minister for the department.

Acknowledgement to be sent (2) Within fifteen days after the day on which the Minister receives the petition from the Auditor General, the Minister shall send to the person who made the petition an acknowledgement of receipt of the petition and shall send a copy of the acknowledgement to the Auditor General.

Minister to respond (3) The Minister shall consider the petition and send to the person who made it a reply that responds to it, and shall send a copy of the reply to the Auditor General, within

- (a) one hundred and twenty days after the day on which the Minister receives the petition from the Auditor General; or
- (b) any longer time, where the Minister personally, within those one hundred and twenty days, notifies the person who made the petition that it is not possible to reply within those one hundred and twenty days and sends a copy of that notification to the Auditor General.

Multiple petitioners (4) Where the petition is from more than one person, it is sufficient for the Minister to send the acknowledgement and reply, and the notification, if any, to one or more of the petitioners rather than to all of them.

Duty to monitor 23. (1) The Commissioner shall make any examinations and inquiries that the Commissioner considers necessary in order to monitor

- (a) the extent to which category I departments have met the objectives, and implemented the plans, set out in their sustainable development strategies laid before the House of Commons under section 24; and
- (b) the replies by Ministers required by subsection 22(3).

Commissioner's report	<p>(2) The Commissioner shall, on behalf of the Auditor General, report annually to the House of Commons concerning anything that the Commissioner considers should be brought to the attention of that House in relation to environmental and other aspects of sustainable development, including</p> <ul style="list-style-type: none"> (a) the extent to which category I departments have met the objectives, and implemented the plans, set out in their sustainable development strategies laid before that House under section 24; (b) the number of petitions recorded as required by subsection 22(1), the subject-matter of the petitions and their status; and (c) the exercising of the authority of the Governor in Council under any of subsections 24(3) to (5).
Submission and tabling of report	<p>(3) The report required by subsection (2) shall be submitted to the Speaker of the House of Commons and shall be laid before that House by the Speaker on any of the next fifteen days on which that House is sitting after the Speaker receives it.</p>
Strategies to be tabled	<p>24. (1) The appropriate Minister for each category I department shall cause the department to prepare a sustainable development strategy for the department and shall cause the strategy to be laid before the House of Commons</p> <ul style="list-style-type: none"> (a) within two years after this subsection comes into force; or (b) in the case of a department that becomes a category I department on a day after this subsection comes into force, before the earlier of the second anniversary of that day and a day fixed by the Governor in Council pursuant to subsection (4).
Updated strategies to be tabled	<p>(2) The appropriate Minister for the category I department shall cause the department's sustainable development strategy to be updated at least every three years and shall cause each updated strategy to be laid before the House of Commons on any of the next fifteen days on which that House is sitting after the strategy is updated.</p>
Governor in Council direction	<p>(3) The Governor in Council may, on the recommendation of the appropriate Minister for a department not named in Schedule I to the <i>Financial Administration Act</i>, direct that the requirements of subsections (1) and (2) apply in respect of the department.</p>
Date fixed by Governor in Council	<p>(4) On the recommendation of the appropriate Minister for a department that becomes a category I department after this subsection comes into force, the Governor in Council may, for the purpose of subsection (1), fix the day before which the sustainable development strategy of the department shall be laid before the House of Commons.</p>
Regulations	<p>(5) The Governor in Council may, on the recommendation of the Minister of the Environment, make regulations prescribing the form in which sustainable development strategies are to be prepared and the information required to be contained in them.</p>

SCHEDULE
(Section 2)

Atlantic Canada Opportunities Agency

Agence de promotion économique du Canada atlantique

Canada Revenue Agency

Agence du revenu du Canada

Canadian International Development Agency

Agence canadienne de développement international

Economic Development Agency of Canada for the Regions of Quebec

Agence de développement économique du Canada pour les régions du Québec

Parks Canada Agency

Agence Parcs Canada



Climate Change—An Overview

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Climate Change—An Overview

Introduction

1. Since 1990, the Government of Canada has made domestic and international commitments to address climate change. To fulfil these commitments, it has developed many plans and programs and has allocated billions of dollars. This 2006 Report of the Commissioner of the Environment and Sustainable Development deals with selected aspects of the Government's response. Climate change is a complex issue. We felt it was important to offer some background information to provide context for the readers of this report. To avoid repetition in each of the separate chapters, this overview serves as an introduction and a companion to each chapter. It provides some general information about climate change, its projected effects, and international and Canadian responses.

We recognize that there is ongoing debate on many aspects of climate change. This discussion is best left to other forums. The Government of Canada has accepted the need to take action, made binding international commitments, and invested significant resources to address climate change. The complex nature of this issue means that we cannot be comprehensive in our coverage. We leave it to readers to seek additional information as needed and form their own conclusions.

The information in this overview is drawn from publicly available sources provided by the Government of Canada and multilateral organizations such as the United Nations, whose documents have been accepted as a basis to inform policy decisions by governments around the world, including Canada. It does not contain any original research, opinion, or analysis by the Office of the Auditor General of Canada.

2. There are many uncertainties associated with climate change including incomplete knowledge of the global climate system, and future rates of human-generated greenhouse gas emissions and how they will affect climate. There are also scientists who disagree that human activities are responsible for climate change. In its *Climate Change 2001: Synthesis Report*, the **Intergovernmental Panel on Climate Change** (IPCC) writes that deciding what to do about climate change means dealing with uncertainty. The impacts of climate change could be more or less serious than scientists project. Governments must balance the risks of either insufficient or excessive action, while considering the economic and environmental consequences, their likelihood, and society's attitude towards risk.

The World Meteorological Organization and the United Nations Environment Program established the **Intergovernmental Panel on Climate Change** in 1988 to undertake periodic, comprehensive assessments of climate change, its projected effects, and options for mitigating and adapting to the risks it poses.

The precautionary principle—In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Source: Rio Declaration on Environment and Development: Principle 15

3. In the absence of certainty, governments may apply what is commonly known as **the precautionary principle** to issues related to the environment and development. Canada and 178 other nations endorsed the precautionary principle at the 1992 United Nations Conference on Environment and Development. The Government of Canada has applied the precautionary principle to climate change, stating that the risks of climate change are real and significant and that such risks “make it prudent that we begin precautionary action now.”

Explaining Climate Change

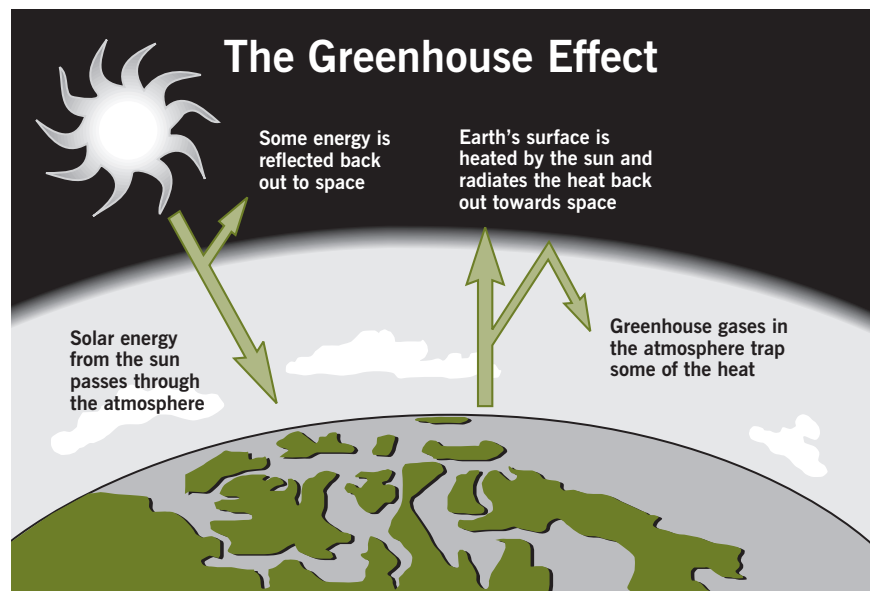
The greenhouse effect

Did you know?

Water vapour is the largest contributor to the natural greenhouse effect. While human activities do not directly increase water vapour concentrations, warmer air holds more moisture, which in turn causes further warming.

4. A natural system, known as the “greenhouse effect” because it resembles the role of glass in a greenhouse, regulates the temperature on Earth (Exhibit 1). Greenhouse gases, which make up less than one percent of the atmosphere, absorb and transmit solar energy, thereby warming the Earth’s surface. These gases include water vapour, carbon dioxide, methane, nitrous oxide, and ozone. Without naturally occurring greenhouse gases, the temperature on Earth would drop from the current average of plus 14 degrees to minus 18 degrees Celsius—too cold to sustain many forms of life on earth.

Exhibit 1 How the greenhouse effect works



Source: Environment Canada 2006

Did you know?

Weather is the state of the atmosphere, including temperature, wind, and precipitation, at a given place or time.

Climate describes the average weather, including temperature, wind, and precipitation patterns that a region experiences over time (usually a thirty-year period). To put it simply, climate is what we can expect, but weather is what we get.

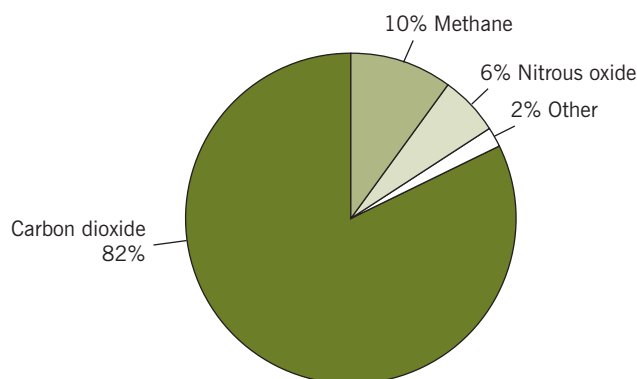
Global warming refers to an increase in the average global surface temperature.

Climate change refers to a change in average weather.

5. The world's climate varies considerably over long periods of time, responding to natural changes in solar radiation, and to the Earth's orbit and volcanic activity. But many scientists generally agree that a new kind of climate change is now under way. Since the Industrial Revolution, certain human activities have released more of the naturally occurring greenhouse gases and added new ones, such as some chemicals from industrial activities. These emissions increase concentrations of greenhouse gases in the atmosphere. Current concerns about climate change revolve around the role of human activities in increasing greenhouse gas concentrations in the atmosphere. Many scientists agree that rising concentrations of greenhouse gases enhance the natural greenhouse effect, raising temperatures, disturbing the balance of natural systems, and damaging ecosystems.

6. The main greenhouse gases released by human activities are carbon dioxide, methane, and nitrous oxide (Exhibit 2). Carbon dioxide is the predominant greenhouse gas released by developed countries. According to the United Nations, the production and consumption of fossil fuels accounts for approximately 80 percent of carbon dioxide emissions from human activities. Deforestation, which releases carbon dioxide into the atmosphere when trees are burned or decompose, is the second largest source of carbon dioxide. Methane is released by landfills, waste water treatment, some agricultural practices, and livestock. Sources of nitrous oxide include chemical fertilizers and burning fossil fuels. "Other" greenhouse gases are the three synthetic chemicals measured by the United Nations. These are sulphur hexafluoride, perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs).

Exhibit 2 Carbon dioxide is the predominant greenhouse gas released by developed countries



Source: *Greenhouse Gas Emissions Data for 1990–2003*, submitted to the United Nations Framework Convention on Climate Change (2005)

The science of climate change

Key conclusions of the Intergovernmental Panel on Climate Change

First Assessment (1990). Human activities are substantially increasing atmospheric concentrations of greenhouse gases, and this will enhance the greenhouse effect and result in an additional warming of the Earth's surface.

Second Assessment (1995). The balance of evidence suggests a discernible human influence on global climate.

Third Assessment (2001). There is new and stronger evidence that human activities are responsible for most of the warming over the last 50 years. Emissions from human activities continue to alter the atmosphere in ways that are expected to continue to change the climate. Climate change effects will persist for many centuries.

7. As part of its mandate to assess climate change and its effects, the Intergovernmental Panel on Climate Change (IPCC) published its third and most recent assessment in 2001. IPCC reports are based on published, peer-reviewed scientific literature and research from scientists around the world. Several thousand experts, including many Canadians, write and review the reports. Their findings have been endorsed by many nations, including Canada, as a sound base upon which to develop both national and international responses.

8. Making informed decisions about how, or if, to respond to climate change requires a good understanding of the climate system and its response to increasing greenhouse gas levels. Climate science plays a crucial role in helping to understand the potential scope and implications of climate change through

- Climate monitoring—observing, recording, and analyzing past and present climate using direct measurement and proxy data (such as tree rings and ice core data);
- Climate modeling—using computers to simulate the global climate system, by reproducing past and current states, and projecting how climate will behave in the future.

9. According to the IPCC 2001 assessment, atmospheric concentrations of carbon dioxide increased by about 31 percent between the years 1750 and 2000. Concentrations of methane and nitrous oxide had increased by approximately 150 percent and 15 percent, respectively. The IPCC notes that present concentrations of carbon dioxide appear to be higher than at any time during the past 420,000 years and that the current rate of increase may have been unprecedented in the past 20,000 years.

10. The IPCC has assessed several possible scenarios using a variety of factors that can influence greenhouse gas emissions, such as global population, and economic, technological, and social trends. By 2100, atmospheric concentrations of carbon dioxide are projected to range from 75 to 350 percent above pre-industrial levels. The IPCC asserts that the risks of climate change damage would be reduced by stabilizing concentrations of carbon dioxide in the atmosphere and that stabilizing these concentrations would require substantial reductions in emissions below current levels.

Impact of climate change

11. Climate change is more than a warming trend. Increasing temperatures are projected to change many aspects of the weather, including wind patterns, the amount and type of precipitation that a region will experience, and the frequency of severe weather events. The impacts are expected to vary regionally, with land areas warming up more than oceans do, and with greater warming occurring in the Northern Hemisphere. The IPCC concludes that biological, physical, and human systems are already affected by climate change.

Observed climate changes

12. According to the IPCC's *Climate Change 2001: Synthesis Report*, some examples of observed climate change are that

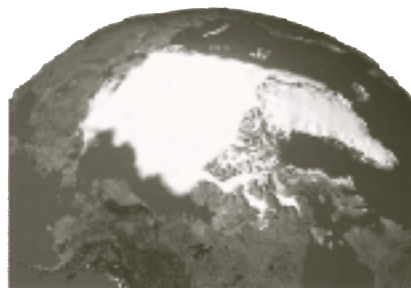
- the average global temperature increased by about 0.6 degrees Celsius during the 20th century;
- the average global sea level increased 10 to 20 centimetres in the 20th century;
- growing seasons in the Northern Hemisphere are longer now, and many plants, insects, and animals have shifted their range to higher elevations and towards the poles; and
- non-polar glaciers have retreated, and in recent decades the extent and thickness of Arctic sea ice during late summer to early autumn has been reduced by about 40 percent (Exhibit 3).

Did you know?

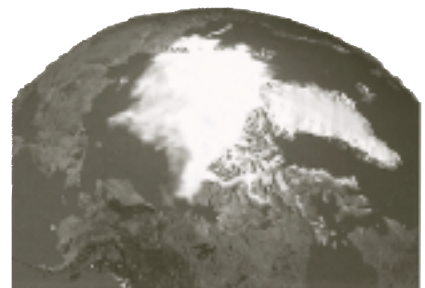
Carbon dioxide can remain in the atmosphere for up to 200 years, which means that stabilizing carbon dioxide emissions at current levels will not immediately stabilize atmospheric concentrations.

According to the Intergovernmental Panel on Climate Change, even once concentrations stabilize, temperatures will continue to increase for a century or more. Sea levels will continue rising for millennia, because ice will continue to melt, and because of the long time it takes for oceans to heat up and expand in response to higher air temperatures.

Exhibit 3 Changes in Arctic sea ice, 1979 to 2003



Observed sea ice September 1979



Observed sea ice September 2003

Source: NASA

Projected climate changes

13. Climate change models are used to assess the likelihood of potential changes and their possible impact. According to the IPCC, even the minimum predicted shifts in climate for the 21st century are likely to be significant and disruptive. While climate change will probably affect natural and socio-economic systems both beneficially and adversely, adverse effects are projected to predominate if the changes become more drastic or occur more swiftly. Our capacity to adapt may not be able to keep pace with the rate and magnitude of the climate change. Changes projected by the IPCC include the following:

- The average global temperature may increase by 1.4 to 5.8 degrees Celsius between 1990 and 2100, increasing heat stress and mortality in human and natural systems. Higher temperatures are expected to expand the range of some dangerous “vector-borne” diseases such as malaria.
- Global precipitation is expected to increase, but some areas such as the American grain belt and sub-Saharan Africa will likely become drier. In most tropical and subtropical regions, crop yields may decrease, and water is likely to become more limited in water-scarce areas of the world.
- Sea level is projected to increase 9 to 88 centimetres by 2100, which could contaminate fresh water supplies, damage coastal resources such as beaches and fisheries, and potentially displace millions of people.
- Extreme weather events, such as tropical cyclones and intense wind and rain storms, are expected to increase over some areas. More floods and droughts in many regions are likely.
- While some animal and plant species will benefit, many of the world’s endangered species may become extinct over the next few decades as warmer conditions alter their habitat and human development blocks them from migrating elsewhere.

Effects on Canada

14. Many nations, including Canada, have developed their own scientific programs to better understand the potential impacts of climate change at national and regional levels. According to the Government of Canada, climate change is expected to affect every region and virtually every sector of the Canadian economy. Agriculture, forestry, and fisheries will be particularly affected. While many of the effects of climate change are expected to be negative, there may be positive effects in some parts of Canada, such as

milder winters and longer growing seasons. In the Prairies, increased temperatures may provide opportunities for growing higher-value crops, but more frequent droughts and insufficient rainfall could negate those opportunities. For Canada, some of the potential negative effects of climate change include

- drier summers in the Prairies and central Canada,
- increases in pest outbreaks and forest fires,
- an increase in heat-related mortality and illness, and
- extensive thawing of permafrost in the North.

Addressing Climate Change

15. The two basic responses to climate change are

- mitigation—minimizing emissions and reducing atmospheric concentrations of greenhouse gases; and
- adaptation—responding and adapting to climate change impacts.

Mitigation is considered essential for minimizing future impacts, and adaptation is essential for coping with effects that we cannot avoid in the near- to medium-term.

Mitigation—reducing emissions

16. Mitigation involves human intervention to reduce the sources or enhance the storage of greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC), no single option will reduce emissions enough to stabilize greenhouse gas concentrations, and a portfolio of options is needed.

Energy production and consumption

17. Since the production and consumption of fossil fuels is the largest source of greenhouse gas emissions from human activities, taking effective action to address climate change involves transforming the way we produce and use energy. Strategies to reduce emissions from the energy sector include

- reducing the output of greenhouse gases for each unit of energy produced;
- reducing energy consumption, for example, by increasing energy efficiency in key consuming areas: industry, buildings, equipment, and transportation; and
- increasing the use of energy derived from non-fossil fuel sources, such as wind energy and ethanol.

Other mitigation options

18. Other mitigation options include reducing non-carbon dioxide emissions, for example, by recovering methane emissions from waste management and enhancing carbon storage in sinks. Carbon sinks are natural or man-made processes that remove greenhouse gases from the atmosphere. Carbon storage options include

- protecting and enhancing storage in natural systems, such as forests and soils (which are natural carbon sinks); and
- capturing carbon dioxide produced during energy production and consumption for long-term storage underground or in oceans.

The role of technology

19. According to the United Nations, the development and widespread use of new technologies plays a major role in climate change mitigation. Just as old technologies, such as coal-fired power stations and internal combustion engines, have contributed to an increase in emissions, so new and more efficient technologies can reduce emissions. Available technologies, such as wind turbines, hybrid engines, and carbon dioxide storage, offer some opportunities to reduce the emissions accumulating in the atmosphere.

Adaptation—coping with climate change

20. According to the Intergovernmental Panel on Climate Change (IPCC), past emissions have already committed the Earth to some climate change, making adapting to climate change a necessary strategy that should go hand in hand with measures to mitigate against climate change. Climate change adaptation refers to adjustments made by natural or human systems in response to climate effects. Adaptation in human systems can be either reactive (responding to the immediate effects of climate change) or proactive, taking steps to prevent the effects of climate change. Governments react to immediate crises such as extreme weather events, but can also take a proactive approach by assessing potential future impacts and their risks, and by developing strategies to reduce these risks. Strategies can include changing design and construction standards to ensure that new construction is resilient to future weather extremes, and protecting coastal communities with seawalls. Rapid and significant climate change will make it more difficult to adapt than would lesser and slower change.

Policy options

21. The United Nations document *United Nations Framework Convention on Climate Change: The First Ten Years* (2004) notes that the policies and measures selected by various countries to address climate

change have many common elements. These include an emphasis on transforming energy production and consumption practices, and addressing emissions in key sectors such as transportation, industry, agriculture, forestry, and waste. The report also outlines some options that governments can use to address climate change, including developing policies or programs to promote

- information, education, and public awareness, to sensitize the public to the issue, and to actions they can take;
- negotiating voluntary agreements with industry;
- research and development, including helping to advance climate change science and new technologies to address climate change;
- regulations and standards, such as energy efficiency standards for household appliances;
- market instruments, such as emissions trading systems (where emitters that reduce their annual emissions below voluntary or imposed limits can receive credit for the amount of pollution not emitted, and companies can save or trade credits for cash or other considerations on the open market); and
- economic and fiscal instruments, such as taxes on carbon dioxide emissions or energy use; financial incentives such as grants, subsidies, preferential loan rates and tariffs; and various types of tax relief.

Canada's International and Domestic Commitments

The international context

22. The atmosphere has no boundaries, making climate change a global problem requiring international solutions. Developed countries account for the largest part of historical and current greenhouse gas emissions. Canada has among the highest per capita emissions in the world and contributes approximately two percent of global emissions. According to the United Nations, while per capita emissions in developed countries are expected to stabilize (at well above the world average), emissions from developing countries continue to rise steadily and are expected to equal those of developed countries in the early parts of this century. In China, even though per capita emissions are low compared to Canada's, the country's absolute emissions are substantial—about three billion tonnes of carbon dioxide in 2000—approximately four times higher than Canada's.

International agreements

Article 3.1 of the United Nations Framework Convention on Climate Change states that

The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof.

Annex I Parties consist of industrialized or developed countries that in 1992 were members of the Organisation for Economic Co-operation and Development (OECD), and countries transitioning to a market economy, such as the former Eastern Block countries.

Annex II Parties consist of the OECD members of Annex I.

Annex B Parties consist of developed nations as well as Central and Eastern European countries that accepted emissions targets under the Kyoto Protocol.

United Nations Framework Convention on Climate Change

23. In 1992, Canada, along with more than 150 other countries, committed to reducing its greenhouse gas emissions by signing the United Nations Framework Convention on Climate Change at the United Nations Conference on the Environment and Development (also referred to as the Earth Summit). In December 1992, Canada became one of the first countries to ratify its signature to the Convention.

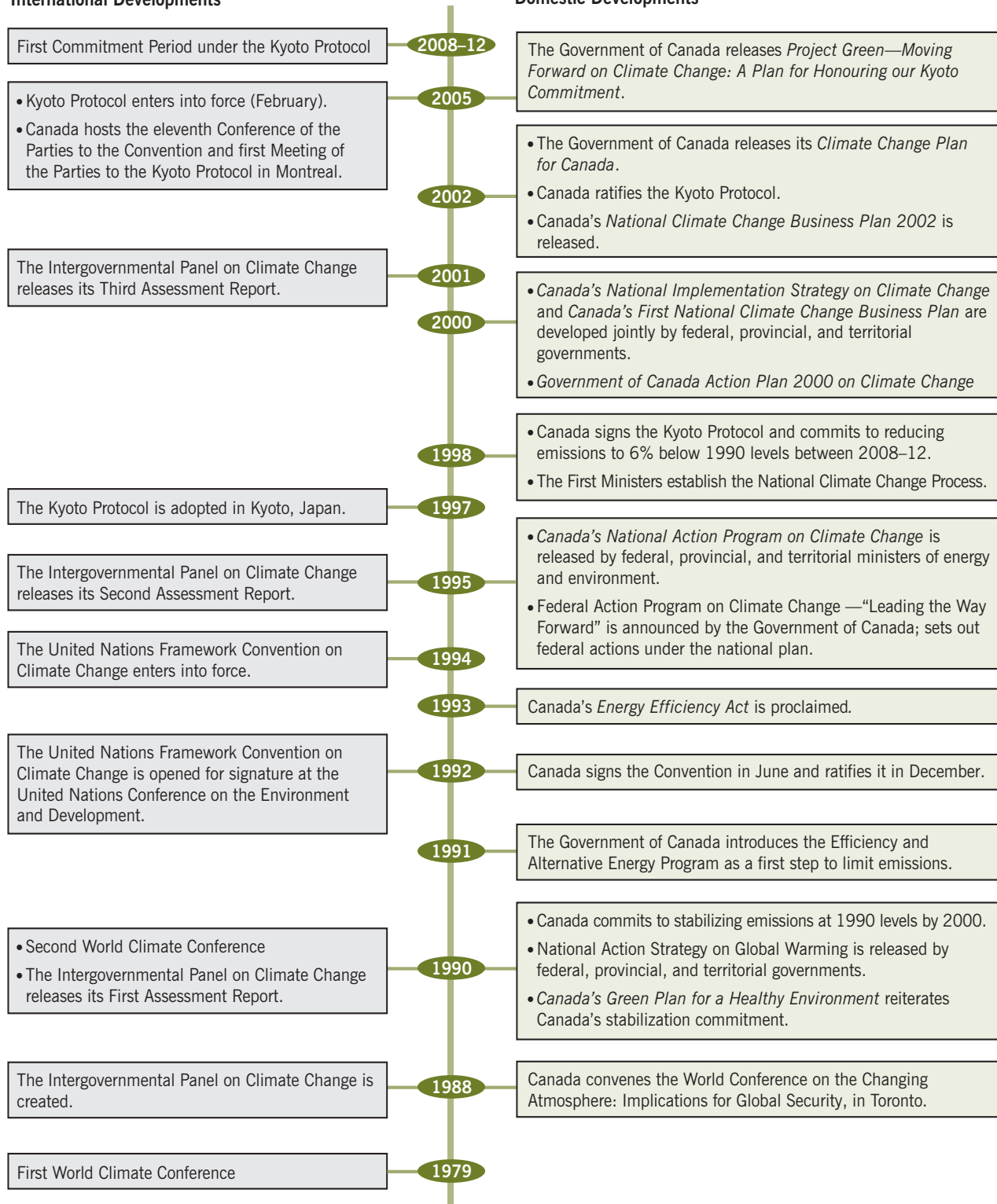
24. The Convention's ultimate objective is to stabilize greenhouse gas concentrations in the atmosphere at "a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system." The Convention states that we need to stabilize emissions at a pace that allows ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable sustainable economic development to proceed. The Convention also recognizes that developed and developing countries have common but differentiated responsibilities and differing capacities to address climate change. Since they are richer and more industrialized, developed countries accepted the initial responsibility for cutting greenhouse gas emissions.

Canada's responsibilities under the Convention

25. As an Annex I and II Party to the Convention, Canada promised to undertake a number of actions, including

- implementing policies and measures to mitigate climate change,
- adopting policies and measures to facilitate adaptation,
- developing and implementing public education and awareness programs,
- undertaking climate research and observation,
- submitting regular "national communications" describing the policies and measures adopted, and
- submitting annual inventories of greenhouse gas emissions by source and removals by sinks.

In addition, Annex II Parties must help developing countries to adapt, promote, and finance their access to environmentally sound technologies. For information on Canada's domestic response to its climate change commitments, see Exhibit 4.

Exhibit 4 Timeline of key international and domestic climate change events**International Developments****Domestic Developments**

The Kyoto Protocol

26. In 1997, more than 160 countries, including Canada, negotiated the Kyoto Protocol aimed at strengthening the Convention. The Protocol has emissions targets for Annex B Parties, which include 38 developed countries and the European Union. Canada and more than 150 other countries have ratified or accepted the Protocol, while some signatories to the agreement, including the United States and Australia, have not. The Protocol became legally binding for its ratifying members on 16 February 2005.

27. The Kyoto Protocol created several new mechanisms to allow Parties to reduce emissions in other countries and credit the results towards their own targets. The Kyoto mechanisms are intended to supplement domestic action and include

- Joint Implementation, through which developed countries (Annex I Parties) acquire emissions credits by financially supporting projects in other Annex I countries.
- an international emissions trading regime that will allow industrialized countries to buy and sell emissions credits amongst themselves; and
- the Clean Development Mechanism, expected to stimulate projects in developing countries that reduce emissions and promote sustainable development.

Industrialized countries can receive credit for financing Clean Development Mechanism projects.

Canada's obligations under the Kyoto Protocol

28. Canada's Kyoto target. Canada's target is to reduce emissions of greenhouse gases covered under the Protocol to six percent below 1990 levels, over the period 2008 to 2012. Kyoto Protocol emission reduction targets cover six greenhouse gases.

29. Annex B Parties are subject to binding emission targets under the Kyoto Protocol. They have other responsibilities, which are listed in paragraph 25 above. They were required to make demonstrable progress towards achieving their commitments, and to report on the progress made, by 1 January 2006. The Protocol also requires them to include supplementary information in their reports, demonstrating compliance with their commitments under the Convention.

30. Penalties for not meeting the Kyoto target. A Party that fails to meet its emission reduction target must make up the difference, plus

Did you know?

- There are six main greenhouse gases: three that occur naturally, and three that occur as a result of synthetic and industrial processes.
- The Kyoto Protocol sets targets for curbing emissions of these six greenhouse gases.
- The three "natural" greenhouse gases are: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).
- The three "man-made" greenhouse gases are: sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

an extra 30 percent, in the second Kyoto commitment period. It must also develop a compliance action plan. Its eligibility to participate in emissions trading may be suspended.

31. Parties to international agreements meet regularly to assess progress and discuss emerging issues. The Conference of the Parties to the United Nations Framework Convention on Climate Change (COP) is the supreme body of the Convention, comprising all states that have ratified the Convention. Eleven COP meetings have taken place since the agreement entered into force in 1994. In addition, there will be regular Meeting of the Parties to the Kyoto Protocol (MOP) sessions.

32. After the first commitment period. The initial commitment period of the Kyoto Protocol, which ends in 2012, is considered a first step towards addressing climate change. The eleventh conference of the Parties to the United Nations Framework Convention on Climate Change (usually called COP11) and the first Meeting of the Parties to the Kyoto Protocol (usually called MOP1) were held in Montreal in December 2005. At that time, the Parties agreed to begin discussions on post-2012 options and launched negotiations on the second Kyoto commitment period. At a follow-up meeting in Bonn, Germany, in May 2006, the Parties agreed to the agenda for negotiations on new emission reductions targets. To inform Canada's next steps, in 2005 the Government of Canada requested that the **National Round Table on the Environment and the Economy** provide advice regarding a long-term energy and climate change policy for Canada, and also requested that it consider options for post-2012 emission reduction targets.

The **National Round Table on the Environment and the Economy** was established as an advisory body reporting to governments and the Canadian public. Its members are appointed by the Prime Minister and include leaders in business and labour, universities, environmental organizations, Aboriginal communities, and municipalities.

33. Other international activities. Apart from formal international agreements negotiated through the United Nations, other groups and nations have made commitments to address climate change. For example, the Government of the United Kingdom made climate change one of its top two priorities during its 2005 presidency of the G8 and the European Union. In July 2005, at the G8 Gleneagles Summit in Scotland, G8 leaders, whose nations collectively account for over 65 percent of global gross domestic product and 47 percent of carbon dioxide emissions, issued a political statement on the importance of climate change and agreed to make “substantial cuts” in emissions. Also in July 2005, the United States, Australia, China, India, Japan, and South Korea formed the Asia-Pacific Partnership on Clean Development, to accelerate the development and deployment of clean energy technologies. The Partnership anticipates that each country will improve energy security, reduce pollution, and address climate change.

The Canadian Context

Carbon dioxide equivalent is used to standardize measurement of greenhouse gas emissions. Each greenhouse gas has its own global warming potential. For example, methane is 21 times more powerful than carbon dioxide. One tonne of methane is equivalent to 21 tonnes of carbon dioxide.

Canada's greenhouse gas emissions

34. As a signatory to the United Nations Framework Convention on Climate Change, Canada is required to submit a greenhouse gas inventory annually, based on an internationally agreed-upon reporting format. The inventory measures emissions and removals (storage in “sinks”) of major greenhouse gases. For ease of comparison, non-carbon dioxide emissions are expressed in terms of their **carbon dioxide equivalent**.

35. Exhibit 5 illustrates Canada's 2004 greenhouse gas emission inventory and shows the relative impact of the production and consumption of energy on Canada's emissions profile. Canada's energy-related emissions include those that are released when fossil fuels are produced, processed, transported, stored, and delivered.

The following also produce emissions through combustion of fossil fuels:

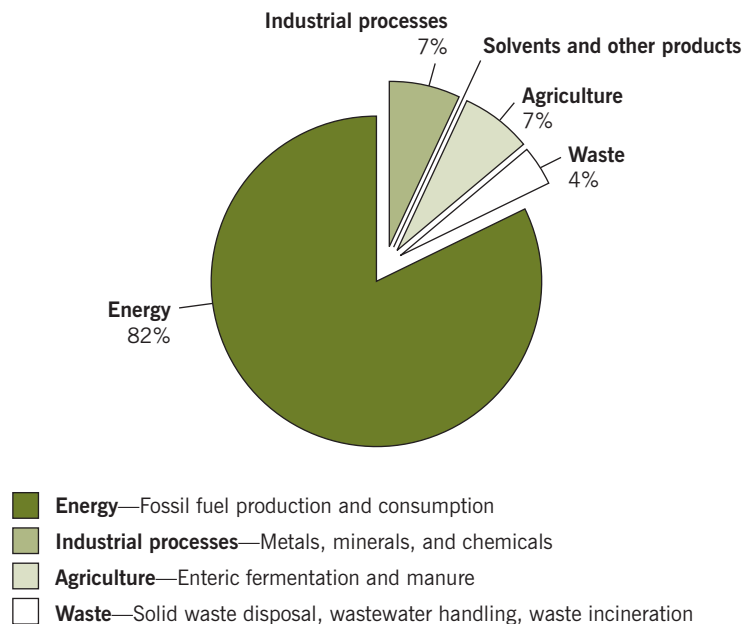
- energy industries, such as refineries and electricity generators;
- manufacturing industries and construction;
- road transportation, aviation, marine transportation, and rail transportation; and
- residential and commercial buildings, which produce emissions when fossil fuels are used for heating.

Jurisdictional issues

36. In Canada, developing cost-effective responses to environmental issues that cross jurisdictional boundaries can involve action by all levels of government, and the efforts of industry, non-governmental organizations, and individual Canadians. Jurisdiction over energy is also divided among the federal, provincial, and territorial governments.

37. Federal jurisdiction. The federal government has jurisdiction over environmental issues that cross international and provincial boundaries. It addresses national concerns about the environment and negotiates, signs, and ratifies international treaties on behalf of Canada. With respect to energy, the federal government's responsibilities include policies and legislation in the national interest, nuclear power, and transboundary environmental impacts.

38. Provincial jurisdiction. The provinces and territories have jurisdiction over natural resources within their boundaries, including

Exhibit 5 Energy use is the source of most of Canada's greenhouse gas emissions

Source: Adapted from Environment Canada's *National Inventory Report 1990–2004: Greenhouse Gas Sources and Sinks in Canada* (April 2006)

energy resources such as oil, natural gas, and coal. They control power generation, provincial building codes, and provincial transportation, including inspection and maintenance of vehicles on the road. Finally, they have jurisdiction over municipal governments, which also have an influence on greenhouse gas emissions through their management of local services, such as infrastructure, urban planning, and development.

Canada's response to climate change

39. Since 1990, the Government of Canada has established a variety of plans and strategies and other mechanisms to address climate change (Exhibit 4). The most recent plan, Project Green, was released in April 2005. A new plan is in development.

What Canada is doing with respect to its Kyoto target

40. The challenge in meeting Canada's Kyoto target is often expressed in terms of an "emissions gap." This is the difference between projected annual business-as-usual emissions (the emissions that would occur in the absence of any specific requirements to reduce emissions) in 2008–12, and Canada's Kyoto target.

Did you know?

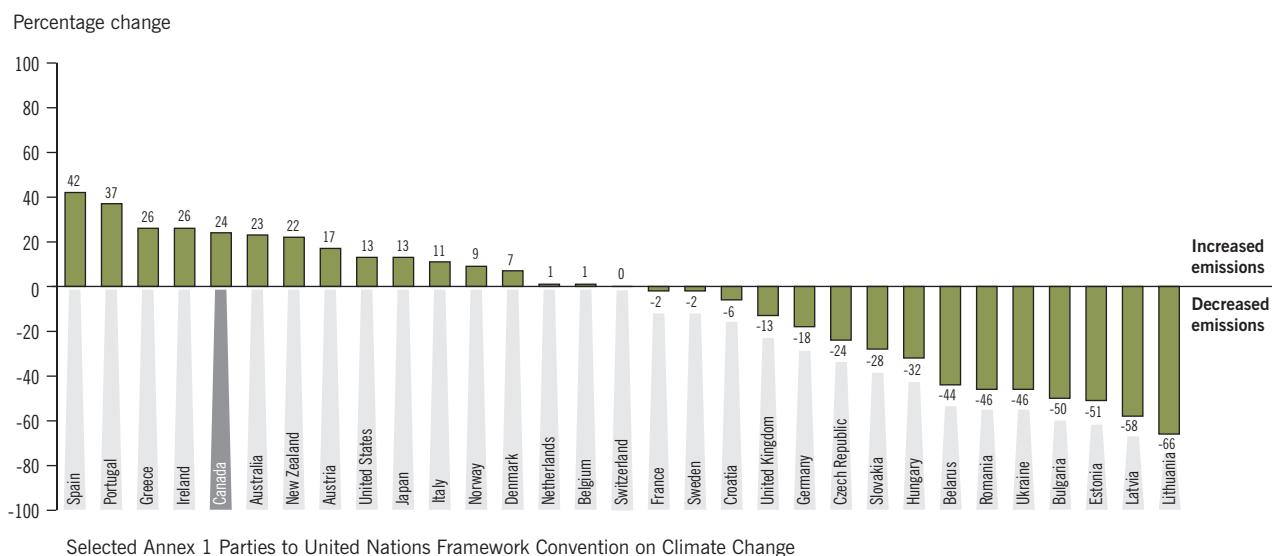
- **One metric tonne** equals 1,000 kilograms. The volume of one tonne of greenhouse gas emissions would fill one average two-storey, three-bedroom house.
- **One megatonne (Mt)** equals one million metric tonnes of greenhouse gas emissions, enough to fill one million average two-storey, three bedroom houses.

41. According to the Government of Canada’s *National Inventory Report—Greenhouse Gas Sources and Sinks in Canada (1990–2004)*, in 2004, Canadians emitted 758 million tonnes of greenhouse gases into the atmosphere, 34.6 percent higher than Canada’s Kyoto Protocol target. Much of this growth is attributed to increased emissions from energy industries and from transportation, whose emissions increased 41 percent and 30 percent respectively between 1990 and 2004. Within the energy industry, the increase is largely fuelled by increased demand for electricity and growing oil and gas production for export. Transport-related emissions account for over one-quarter of Canada’s emissions, and within this sector the largest increase is from light trucks (including mini vans and sport utility vehicles)—an increase of more than 100 percent from 1990 to 2004.

Comparing Canada to other countries

42. Exhibit 6 shows how Canada’s greenhouse gas emissions stack up with those of other countries. Canada and other highly industrialized countries increased their emissions. Countries with economies in transition experienced economic downturn, with reduced emissions. According to the United Nations, the reduced emissions of these countries more than offset the increased emissions by industrialized countries. As a group, Annex I countries had reduced emissions by 5.9 percent compared to 1990 levels. Every year, each Annex I Party submits a greenhouse gas emission inventory to the Secretariat for the

Exhibit 6 Canada’s emissions increased between 1990 and 2003



United Nations Framework Convention on Climate Change. The changes shown in Exhibit 6 are based on the total emissions that each country has reported.

Conclusion

43. This overview has given background information on the issue of climate change to provide readers with context for the audit chapters that follow. The complex and multi-faceted nature of this topic means that we could not be comprehensive in our coverage. We leave it to readers to seek additional information and form their own conclusions. In keeping with our mandate, our performance audits look at whether activities designed to respond to federal environment and sustainable development policies are being implemented effectively and are delivering results. The audit chapters that follow provide our findings from auditing several aspects of the federal response to climate change.



**Main Points—
Chapters 1 to 5**

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Main Points

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Managing the Federal Approach to Climate Change

Chapter 1 Main Points

What we examined

Responsibility for Canadian action on climate change is shared among several federal organizations. They include a number of departments and agencies with widely differing mandates, and foundations such as Sustainable Development Technology Canada. The federal government also shares responsibilities with provincial and territorial governments; industry, municipal governments, and individual Canadians have significant roles to play as well.

We examined how the federal government is organized to manage its climate change activities, whether it is able to report the costs and the results of its efforts, and on what basis it developed key targets for reductions in greenhouse gas emissions.

We also reviewed two new tools the government has chosen to help achieve its climate change objectives. We looked at how ready the government is to implement an effective domestic system for the trading of greenhouse gas emissions. And we looked at Sustainable Development Technology Canada, a foundation the government established in 2001 to, among other things, help reduce greenhouse gas emissions through technological innovation.

Why it's important

Canada has international commitments to reduce its greenhouse gas emissions, and specifically to reduce its emissions to 6 percent below 1990 levels between 2008 and 2012. Although the federal government has announced billions of dollars in funding since 1992 toward meeting these commitments, as of 2004 Canada's greenhouse gas emissions were 26.6 percent above 1990 levels.

Responding to climate change is a horizontal issue—that is, one whose management cuts across multiple departments, mandates, and jurisdictions. No single department, agency, or government has all the levers, resources, and expertise to manage this issue adequately. Effective governance and accountability are required to ensure that key departments work together in a coherent manner, co-ordinating their efforts to avoid duplication; and that Parliament and the public are able to fully scrutinize the costs and the results of those efforts.

If Canada is to reduce its greenhouse gas emissions enough to meet its commitments, it will need a comprehensive plan that addresses the major sources of emissions. Such a plan is required to help initiate the transformation that Canada's economy must undergo if the way it affects the climate is to change. It is critical that the federal approach in key sectors include policy tools and targets that are based on sound data, analysis, and management.

Sustainable Development Technology Canada has received \$280 million in federal funding dedicated to supporting and financing the development and demonstration of climate change technologies. It is important that it fund projects that can contribute to achieving the government's objectives for its climate change efforts.

What we found

- The government has yet to create an effective governance structure for managing its climate change activities. This is despite various studies that have pointed to the need for governance mechanisms and despite internal commitments made since 2003 to put in place a renewed governance structure for climate change.
- There is no government-wide consolidated monitoring and reporting of spending and performance information on climate change activities. The Treasury Board Secretariat is developing a system for capturing this information, but it is not yet fully operational, and responsibility for its management has not been assigned. The Secretariat was unable to provide us with documentation to fully substantiate its response to a parliamentarian's question in 2005, when it said that federal spending on climate change totalled \$1.6 billion. Nor were we able to accurately replicate the reported total expenditures using the available data. Until the current system is improved, it is not sufficiently accurate for managing and reporting purposes.
- Measures to reduce greenhouse gas emissions in the transportation and industry sectors—which together account for about 78 percent of Canada's greenhouse gas emissions—are not expected to bring emissions below 1990 levels; they may only slow the rate at which greenhouse gas emissions in these sectors continue to grow. A voluntary agreement with the automotive industry contains no provision for independent verification of the model, data, and results used to determine progress.
- The proposed systems for reducing greenhouse gas emissions from large industrial emitters and for domestic emissions trading are highly complex. Progress to date has been slow, and many issues, such as public disclosure of key data, have yet to be resolved.

Distinctive features of the domestic emissions trading system, particularly the \$15 per tonne price cap promised to industry, present potentially serious financial risks to the Canadian taxpayer that could range from zero to over \$1 billion.

- Environment Canada and Natural Resources Canada, the departments sponsoring Sustainable Development Technology Canada, have taken reasonable steps to oversee the Foundation's climate change activities under its funding agreements. For its part, the Foundation has taken reasonable steps toward fulfilling its climate change mandate. In all significant respects, it has adhered to its funding agreements with the government in its strategic decisions and its selection of projects for investment. It has also put in place a satisfactory process for measuring and reporting the results of its climate change activities, although it is too early to report on actual reductions in greenhouse gas emissions. However, we have some concerns with respect to the Foundation's reporting of projected reductions by 2010.

The audited organizations have responded. The organizations have accepted all of our recommendations; their responses are included with the related recommendations throughout the chapter. However, apart from some of the measures Natural Resources Canada and Sustainable Development Technology Canada have agreed to take, the responses make no firm commitment to specific actions with the time frames for implementation.



Adapting to the Impacts of Climate Change

Chapter 2 Main Points

What we examined

We examined whether the federal government has strategies and action plans in place for adapting to and managing the impacts of climate change. We focussed on the work of Environment Canada and Natural Resources Canada in this area. In addition, we examined the work of Public Safety and Emergency Preparedness Canada, Health Canada, and Agriculture and Agri-Food Canada, three departments responsible for areas likely to be affected by climate change. We also looked at whether Indian and Northern Affairs Canada is addressing the implications of climate change in the North.

We also assessed whether the federal government has taken steps to obtain, analyze, and share the information needed to identify the potential impacts to which Canadians are exposed because of climate change. We focussed on the work of Environment Canada and Natural Resources Canada in climate modelling (which provides information on possible future climate conditions), collecting and analyzing climate observations, and conducting research on the impacts of climate change and means of adapting to them.

Why it's important

Canada is vulnerable to the impacts of climate change. More extreme and intense weather events, such as extended heat waves and winter storms, increase the risk to Canadians' health and safety. Climate change is expected to create additional stresses on Canada's water resources. It is also likely to trigger adverse socio-economic impacts in regions that depend on natural resource industries such as forestry and agriculture. The effects of warming are expected to be greater in Canada's northern latitudes than in other regions; many aspects of life in the North are already affected by melting permafrost and reduced sea ice.

Canada has committed to facilitating adaptation to the expected impacts of climate change. Taking steps now to adapt to a changing climate can help protect Canadians and their assets and reduce the potential economic, social, and environmental costs.

What we found

- The government has not yet put in place key measures to support Canadians in adapting to a changing climate. Nor has it clarified how it intends to manage its own adaptation efforts.
- The government has not developed a strategy for federal adaptation efforts to indicate the expected results and timelines, and which departments would assume what responsibilities. Federal progress in working with provinces and territories has been limited.
- Some departments we examined have begun work on their own strategies, but only one has been completed. Departments have made limited progress in using available information about the changing climate to assess potential implications on federal policies and programs.
- The federal government has supported the development of knowledge through impacts and adaptation research and initiatives that involve working with decision makers on adaptation solutions. There is sufficient information for adaptation to proceed. However, the federal government has not yet organized its activities in climate science to make sure that the federal departments and others obtain needed information. For example, there is a lack of up-to-date climate information for use in adapting the design of infrastructures such as storm sewers, and limited information is available to the public on possible future climate conditions in their area.

The departments and central agencies have responded. The departments and central agencies have accepted all of our recommendations; responses are included with the related recommendations throughout the chapter. However, the responses make no firm commitment to specific actions with time frames for implementation.



Reducing Greenhouse Gases Emitted During Energy Production and Consumption

Chapter 3 Main Points

What we examined

Natural Resources Canada (NRCan) is the department that receives the majority of the federal funds aimed at reducing greenhouse gas emissions. It is responsible for implementing federal energy policies and for most federal programs intended to reduce greenhouse gas emissions from energy production and consumption in Canada. The Department is accountable for delivering reductions in greenhouse gas emissions through its policies and programs.

We looked in detail at three NRCan programs that each received \$100 million or more in federal funding earmarked for climate change programs. They provide examples of different areas where NRCan supports efforts to reduce greenhouse gas emissions: the Wind Power Production Incentive (renewable energy), the EnerGuide for Existing Houses program (energy efficiency), and the Ethanol Expansion Program (renewable fuels). We examined what greenhouse gas emission reductions the three programs have achieved, what they have cost, and how the Department monitors and reports on program results and spending. We also examined to what extent NRCan has learned from experience and taken steps to reduce risks in managing its programs. (Near the end of our audit, one of these programs, EnerGuide for Existing Houses, was discontinued).

Finally, we looked more broadly at other emission reduction efforts in the oil and gas sector, and the areas of wind power and home energy efficiency to see whether the Department can demonstrate what its programs and other activities have contributed to the emission reductions targeted in the federal government's plans for addressing climate change.

Why it's important

Energy production and consumption account for more than 80 percent of the greenhouse gas emissions in Canada. And compared with 1990, emissions have risen considerably, largely due to the production and consumption of fossil fuels like oil, natural gas, and coal.

In almost every aspect of their daily lives, Canadians need energy in the form of fuel, electricity, or heat. The national economy also depends on the production of energy, both for domestic use and for

export. However, producing and consuming non-renewable energy releases pollutants into our air, water, and soil. Among those pollutants are greenhouse gases, which governments of many countries, including Canada, have formally linked to climate change.

Changing the way Canadians produce, distribute, and consume energy is therefore critical. As part of its response to climate change, the federal government has announced billions of dollars to support actions aimed at reducing emissions from major Canadian sources.

What we found

- Each of the three programs we examined in detail was funded to reduce greenhouse gas emissions, and they have made progress. As of March 2006, spending on the programs had achieved about 22 percent of the 4.8 million-tonne reduction that NRCan expected the programs to achieve by 2010. However, emission reduction targets for these programs were confusing, making it difficult to determine the actual results that were expected. Further, NRCan did not consistently report publicly on how these programs performed against emission reduction and other targets, making it difficult to hold the Department to account for its results.
- The Wind Power Production Incentive has stimulated investment in Canada's wind power industry during its infancy. The program has made progress toward its targets for electricity generation and greenhouse gas emission reduction, though less than anticipated. NRCan is adjusting the program based on lessons learned, to be ready should additional funds be approved. The Department has yet to lead the establishment of a long-term strategy for wind power in Canada, identifying where governments can be most effective.
- Oil and gas production, particularly the rapid development of Canadian oil sands, is significantly increasing greenhouse gas emissions. Yet few federal efforts are underway to reduce these emissions, and those efforts have had minimal results to date. For its part, the federal government is counting on regulatory and long-term technological solutions to achieve future reductions in this sector. However, it is not leading the way by clearly stating how and to what degree Canada will reduce greenhouse gas emissions when oil and gas production is expected to increase.

The Department has responded. Natural Resources Canada generally agrees with the recommendations in this chapter. However, in some circumstances, we note that its response does not fully indicate what action it intends to take and the timing for doing so.



Sustainable Development Strategies

Chapter 4 Main Points

What we examined We examined the progress made by federal departments and agencies toward meeting the commitments they made in their sustainable development strategies. We looked at 39 commitments published in the strategies of 21 departments.

Why it's important Sustainable development is based on the efficient and environmentally responsible use of natural, human, and economic resources. This includes sustaining our natural resources, protecting the health of Canadians and ecosystems, and improving our quality of life and well-being.

The sustainable development strategies of its departments and agencies are an important tool by which the federal government can advance sustainable development. The strategies set out goals, objectives, and specific commitments. Effective action to achieve these commitments is fundamental to both the credibility and the impact of the strategies. Our role in independently auditing and reporting on commitments ensures that Parliament and Canadians are kept informed of the government's progress toward sustainable development.

- What we found**
- Progress has been satisfactory on 27 of the 39 commitments we examined.
 - Departments that have made satisfactory progress toward their commitments generally have well-functioning management systems to plan for achieving the commitment, to implement the plan, and to monitor their progress.
 - Departments where progress has been unsatisfactory generally lack such systems and have made minimal efforts toward meeting their commitments. This is of particular concern given the number of years that departments and agencies have had to develop the necessary management systems.
 - In some cases, the progress achieved by a department or agency represents an important step toward environmental protection and sustainable development. For example, Indian and Northern Affairs

Canada made good progress in implementing a management framework to promote and track initiatives that reduce greenhouse gas emissions in Aboriginal and northern communities.

- During the course of auditing the commitments, we found other encouraging signs that organizations are moving forward to make sustainable development part of their operational planning. For example, the Government of Canada has fostered co-ordination across federal organizations to ensure sustainability principles are fundamental to planning for the 2010 Olympic and Paralympic Winter Games. Agriculture and Agri-Food Canada has placed the consideration of sustainable development principles as one of the core elements of the Agricultural Policy Framework.

Environment Canada and the Treasury Board Secretariat have responded. Environment Canada and the Treasury Board Secretariat agree with our recommendation.



Environmental Petitions

Chapter 5 Main Points

What we examined

This is the annual report that the Commissioner of the Environment and Sustainable Development provides to Parliament on the environmental petitions process as required by the *Auditor General Act*. This chapter reports on new petitions received between 1 July 2005 and 30 June 2006.

An environmental petition is a letter to the Auditor General on environmental issues, which the Commissioner of the Environment and Sustainable Development directs to the responsible federal ministers for a response.

In keeping with the focus of the Commissioner's report this year on climate change, this chapter also reports on an audit of the federal government's response to a petition concerning the purchase of green power—power derived from low-impact renewable sources of energy, such as wind. We examined actions taken by Environment Canada, Natural Resources Canada, and Public Works and Government Services Canada to purchase green power and help develop markets for green power.

Why it's important

The environmental petitions process, which is administered by the Commissioner on the Auditor General's behalf, is one way Canadians can hold their government to account for its decisions and actions on environmental matters in the context of sustainable development. Among other things, the process allows both citizens and organizations to ask ministers to investigate environmental problems, explain federal policy, and examine the enforcement of environmental legislation. Petitions have resulted in commitments by ministers and action by departments on environmental issues.

Monitoring and auditing petition responses allow us to examine issues brought forward by Canadians that otherwise may not have been drawn to our attention. In our audits of responses, we assess whether federal ministers are meeting their commitments to act on issues raised in the petitions.

The purchase of green power is one of the cornerstones of the federal government's plan to demonstrate leadership in its response to climate change by reducing its own greenhouse gas emissions. In response to a petition in 2002, the government made a commitment to purchase 20 percent of its electricity from green power sources by 2006. The purchase of green power by the federal government can also play an important role in supporting the development of Canada's capacity to produce green power.

What we found

- **Report on the petitions process.** Statements and commitments made by federal ministers in response to petitions have addressed important issues raised by Canadians. Since 2001, climate change and air quality issues have been referenced increasingly in environmental petitions received by the Auditor General of Canada. Our review of the government's responses to these petitions indicates that most addressed the petitioners' questions or explained the government's position on the issues raised. However, some responses failed to address the specific questions asked by petitioners. In our annual report, we observe that the clarity of the questions in petitions has improved and that petitions are generating action.
- **Green power purchasing.** The federal government has made progress in fostering green power markets in some provinces. However, it has achieved only one third of its objective to purchase 20 percent of its power from green sources by 2006 and has not been contributing as expected to the reduction of greenhouse gas emissions through the Purchase of Electricity from Renewable Resources (PERR) program. Although the PERR program has potential to contribute toward developing green power markets and reducing greenhouse gas emissions, the existing governance of the program remains a key barrier to its success.

The departments and the Treasury Board Secretariat have responded. Environment Canada, Natural Resources Canada, Public Works and Government Services Canada, and the Treasury Board Secretariat have agreed with our recommendation. Their responses follow the recommendation in the chapter.

Report of the Commissioner of the Environment and Sustainable Development to the House of Commons—2006

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