

August 2003

Clean Air in Canada:  
**Progress**  
**2003**  
**Report**  
on **Particulate Matter**  
and **Ozone**



Government  
of Canada

Gouvernement  
du Canada



Canada

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## Message from the Minister



**A**ir quality is a significant environmental concern for Canadians. Evidence continues to mount that air pollution has negative effects on our health. Children, the elderly, and those who suffer from cardiac and respiratory ailments are particularly vulnerable. Air pollution also affects our cities and towns, our rural farmlands, and our northern communities.

Clean air has been a national priority for several years, and its priority was accelerated in 2000 as scientific evidence demonstrated that more and quicker action was necessary.

The Government of Canada has made significant progress since 2000 in addressing clean air, including cooperation and undertaking joint projects with the United States under the *Canada-U.S. Air Quality Agreement*, working with provinces to implement the Canada-wide Standards, and meeting our commitments made in the 10-year regulatory agenda to reduce pollution from all vehicles and engines, and from the fuels that power them. The Government has also committed significant resources to carry out our domestic, trans-border and international clean air and climate change commitments.

In 2001, the Government of Canada introduced the *Interim Plan 2001 on Particulate Matter and Ozone*. This document addressed our obligations under the *Canada-wide Standards for Particulate Matter and Ozone* and raised the bar for action and commitment.

In the *Interim Plan 2001 on Particulate Matter and Ozone*, I committed to reporting back on our progress. The *2003 Progress Report on Particulate Matter and Ozone* is the first periodic report that highlights actions by the federal government and progress made on our commitments in the Interim Plan 2001. These actions, such as the regulatory requirements for cleaner vehicle, fuels and small engines, the installation of more air quality monitoring stations and the tracking of more smog pollutants, demonstrate our commitment to cooperation with industry and provinces to work together for the benefit of all Canadians.

The federal government is continuing to show its dedication and commitment to reducing air pollution and providing motivation for individual and community actions. We will continue to explore new solutions to secure a clean and healthy environment for ourselves and for our children and keep Canadians informed of our future actions and progress.

A handwritten signature in black ink that reads "David Anderson". The signature is fluid and cursive.

David Anderson  
Minister of the Environment



# Introduction

Reducing the effects of air pollution on the health of Canadians and their environment is a key commitment by the Government of Canada.

## Smog and Health

Particulate matter (PM) and ground-level ozone are the main components of smog. More is being learned about the link between smog and a wide variety of respiratory and cardiac health problems. Smog is most prevalent in the Windsor-Quebec City corridor of Ontario and Quebec, the southern Atlantic region, and the Lower Fraser Valley of British Columbia, and it affects urban and rural areas alike.

Smog is perhaps the most readily recognized air quality problem in Canada. The major components of smog, particulate matter (PM) and ozone, have been identified as contributing factors in thousands of premature deaths across the country each year, as well as increased hospital visits, doctor visits and hundreds of thousands of lost days at work and school. The science demonstrating the negative health effects of air pollution has been reconfirmed with the recent publication of studies demonstrating increased risks of lung cancer and heart disease from air pollution.

In Canada, air issues management is a shared responsibility of the Government of Canada and the provinces and territories. These jurisdictions have agreed to a set of Canada-wide Standards (CWS) for PM and Ozone. The CWS include preparing an implementation plan and issuing periodic reports.

*Clean Air in Canada: 2003 Progress Report on Particulate Matter and Ozone* is one such periodic report on federal achievements and progress made on the commitments outlined in the Government of Canada's *Interim Plan 2001 on Particulate Matter and Ozone*. The plan can be obtained from the Government of Canada's Depository Service at: <http://dsp-psd.communication.gc.ca/Collection/En40-632-2001E.pdf>

## Clean Air in Canada – A Timeline

In June 2000, the federal government and the provinces and territories (except for Quebec) signed the CWS for PM and Ozone and agreed to prepare and inform Canadians on implementation plans to reach their goals.

In 2001, the Government of Canada announced its 10-year *Action Plan on Clean Air*. The plan contained actions in the

areas of transboundary air pollution; air emissions from vehicles, engines, and their fuels; marine and aviation sources; emissions from industrial sectors; atmospheric science; science and monitoring networks; public outreach; and supporting actions on climate change.

The *Action Plan on Clean Air* was followed by the release of the Government of Canada's *Interim Plan 2001 on Particulate Matter and Ozone*, which outlined government activities on reducing PM and ozone; the science behind policy decisions to protect the health of Canadians from toxic air pollutants; clean air activities within government; and the programs to engage Canadians to take action at home and in their communities. Jurisdictions that signed the Canada-wide Standards (CWS) for Particulate Matter and Ozone in June 2000 made a commitment at that time to set out an implementation plan for meeting the standards. The Interim Plan 2001 was the first to set out a series of federal commitments, initiatives and actions under this particular CWS process. (Information on the CWS is available on the Canadian Council of Ministers of the Environment (CCME) website at: [www.ccme.ca/initiatives/standards.html](http://www.ccme.ca/initiatives/standards.html))

Since the introduction of the Interim Plan, the Government of Canada has made progress in several areas, including the vehicles and fuels sector, industrial sectors, the National Air Pollution Surveillance (NAPS) Network, the National Pollutant Release Inventory (NPRI), partnerships with other jurisdictions, and the science for PM and ozone.

This report provides brief summaries of federal achievements in the section *Focus on Current Achievements*, including a look at progress in the areas of the *Canadian Environmental Protection Act, 1999* (CEPA 1999), NAPS, NPRI, and vehicles and fuels. This section is followed by details on a future area of activity – volatile organic compounds (VOCs) – and highlights on clean air.

## What Are PM and Ozone – and Where Do They Come From?

PM – particulate matter – is tiny solids or liquid droplets released into the air from sources such as cars, trucks, factories, construction sites, agriculture, unpaved roads, stone crushing, and wood burning. PM is also formed in the air from precursor gases, such as nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), sulphur dioxide, and ammonia. Ozone is a gas formed in sunlight and warm air from the precursor gases NO<sub>x</sub> and VOCs. These gases can come from fuel combustion in motor vehicles, from power plants, and from other industrial processes.

# Focus on Current Achievements

## Transportation: Vehicles and Fuels

There has been significant progress made in the area of vehicles and fuels, one of the largest contributors to air pollution.

### Vehicles and Engines

Since the introduction of the Interim Plan, several new measures have been put in place to control emissions from on-road vehicles.

On January 1, 2003, the new *On-Road Vehicle and Engine Emission Regulations* were finalized and published in the *Canada Gazette*, Part II. These regulations will phase in more stringent emission standards for on-road vehicles and engines under CEPA 1999, beginning on January 1, 2004. The regulations apply to light-duty vehicles, such as passenger cars; light-duty trucks, such as minivans, pickup trucks, and sport utility vehicles; heavy-duty vehicles, such as trucks and buses; and motorcycles.

Prior to the implementation of these new regulations, Environment Canada, in June 2001, signed a Memorandum of Understanding (MOU) with the Canadian Vehicle Manufacturers Association, the Association of International Automobile Manufacturers of Canada, and the member companies of those associations. The MOU formalizes an industry commitment to market the same low emission light-duty vehicles and light-duty trucks in Canada as in the United States in the 2001-2003 model years.

## Transportation Technologies

Transport Canada's \$40 million Urban Transportation Showcase Program demonstrates ways of reducing emissions from transportation. Transport Canada works in partnership with provinces and municipalities to establish a number of transportation "showcases" in selected cities, for demonstrating and evaluating a range of urban transportation strategies within a broad planning framework. For more information, visit: [www.tc.gc.ca/Programs/Environment/UrbanTransportation/](http://www.tc.gc.ca/Programs/Environment/UrbanTransportation/)

In addition, through the auspices of the CCME, Environment Canada coordinated interprovincial cooperation and harmonization in the area of in-use emissions from motor vehicles by developing the CCME *Environmental Code of Practice for On-Road Heavy-Duty Vehicle Emission Inspection and Maintenance Programs*.

Environment Canada is developing a series of regulations for off-road engines to establish Canadian emission standards aligned with those of the U.S. Environmental Protection Agency (EPA). Off-road engines include small spark-ignition engines, such as those in lawn and garden equipment; large spark-ignition engines, such as those in forklifts and ice resurfacers; recreational vehicles and engines, such as outboard engines, personal watercraft, snowmobiles, and off-highway motorcycles; and off-road diesel engines, such as those used in agricultural and construction machines.



## Partners in Sustainable Transportation for Montreal

A pilot project promoting car pooling, active transportation and public transit has been implemented for transporting employees to their workplaces. Carried out in concert with the Agence métropolitaine de transport, the project affects federal employees from Environment Canada and the Canada Customs and Revenue Agency in Montreal. A second component targets employee commuting habits. The region of Quebec has developed a computer program that tracks all employee commuting, including mode of transportation and type of commute, and calculates the associated greenhouse gas emissions. Initially implemented as a pilot project at a branch of Environment Canada, it will then be implemented at other regional branches. The new policy and tools developed by the region will then be proposed to other federal institutions in the Quebec region via the Quebec Federal Council (QFC). This tool will be used to verify the achievability of the objective to reduce greenhouse gases attributed to business travel in the Toronto-Quebec corridor by 10% compared to reference year 1999-2000.

In July 2002, a discussion draft of the planned *Off-Road Small Spark-Ignition Engine Emission Regulations* was released for public consultation. This represented the first milestone in off-road regulatory development. The proposed regulations were published in the *Canada Gazette*, Part I, on March 29, 2003. These new regulations are intended to reduce the level of smog-forming emissions from off-road small spark ignition engines by about 44% relative to the existing memoranda of understanding with manufacturers. As well, engines designed to meet these regulations are also expected to be more fuel efficient.

Another key accomplishment for the off-road sector was the amendment to CEPA 1999 to clarify the authority to regulate small marine engines, such as those used in outboards and personal watercraft, which are expected to be finalized in 2004 and again will build on an existing MOU with industry that is already ensuring cleaner small marine engines are available in Canada.

### Fuels

The *Sulphur in Gasoline Regulations* limit the amount of sulphur in gasoline to an average of 30 parts per million (ppm) in 2005. As an interim step, gasoline with an average sulphur level of no more than 150 ppm was required, starting in July 2002. The reduction of sulphur levels in gasoline will improve the performance of vehicle emission control

equipment and lead to reduced emissions of a wide range of pollutants, including nitrogen oxides (NO<sub>x</sub>) and hydrocarbons. Reduced levels are being seen in 2002 and 2003 as industry moves to comply with the regulatory requirements.

Sulphur in diesel fuel is being addressed through the *Sulphur in Diesel Fuel Regulations*. These regulations currently limit sulphur in diesel fuel used in on-road vehicles to a maximum of 500 mg/kg (or 500 ppm). In mid-2006, the limit will be reduced to 15 mg/kg. These new regulations were finalized on July 31, 2002 and are intended to ensure that the level of sulphur in diesel fuel for use in on-road vehicles will not impede the effective operation of advanced emission control technologies planned for 2007 and later model year vehicles. In the Arctic regions, the limit on sales will not come into effect until 2007 to allow for slower turnover of diesel supplies and to reflect logistical difficulties in the far north.

The *Gasoline and Gasoline Blend Dispensing Flow Rate Regulations* came into effect on February 1, 2001, to limit the flow rate of nozzles used to dispense gasoline and gasoline blends into on-road vehicles. The flow rate is limited to a maximum of 38 litres per minute. The regulations reduce emissions of benzene and other VOCs into the environment during vehicle refuelling by ensuring that flow rates do not exceed the design capacity of the filler pipes on the existing fleet of vehicles or of new on-board refuelling vapour recovery systems being introduced on Canadian vehicles. (Additional information on emission and fuel regulations is available on the CEPA Environmental Registry website at: [www.ec.gc.ca/CEPAregistry/](http://www.ec.gc.ca/CEPAregistry/))

### Fuel Cells

Natural Resources Canada leads the national effort on fuel cells and hydrogen for transportation. Although there are serious technical and cost challenges still to be overcome, a breakthrough in this area will have a major impact on improving urban air quality. Partners include other government departments, provincial governments, universities, and industry. Efforts are directed at all aspects of the issue – from engine to fuel storage to safety, and the infrastructure for production and distribution of fuel.



## Emissions Monitoring – National Pollutant Release Inventory (NPRI)

Canadians are informed about industrial air emissions in their own communities through the NPRI. Created in 1992 and legislated under CEPA, the NPRI requires companies to report emissions information to the Government of Canada on an annual basis. Environment Canada publishes this information in the form of an annual report to the public, as well as in a detailed inventory.

There have been significant improvements made to the NPRI as it continues to grow and serve Canadians with important pollution information. These include:

- reports from a larger number of facilities,
- reports on a wider variety of pollutants,
- plans for on-line reporting for industry, and
- plans to improve the Green Lane Internet site to include database searches on individual communities and neighbourhoods.

Prior to 2002, there were 266 contaminants reported to the NPRI. As of 2002, facilities are to report on an additional seven criteria air contaminants (CACs): total PM, PM less than or equal to 10 microns ( $PM_{10}$ ), PM less than or equal to 2.5 microns ( $PM_{2.5}$ ), sulphur dioxide,  $NO_x$ , VOCs, and carbon monoxide. At the same time, the number of industrial facilities reporting pollutant emissions is expected to rise from 2,100 in 1999 to more than seven thousand by 2005.

At the same time, the Government of Canada has developed a forecast for criteria air contaminants over the period 1995-2020, organized by province or territory. Included in the forecast is an estimation of criteria air contaminants emissions from on-road transportation sources. These projections include the impacts of the Government of Canada's *10-year Plan of Action* for cleaner vehicles, engines, and fuels for on-road transportation.

A national road network database is used to estimate and disseminate road-related air emissions. Road traffic volume information was also collected for the provinces, territories, cities, and municipalities. This new information will help to better allocate air emissions, and it will greatly assist with planning and raising awareness about the impacts of transportation on air quality.

The NPRI was recently expanded, and it now requires the reporting of 60 VOCs. The reporting exemption for the operation of wells in the upstream oil and gas industry was also removed.

Additional information on the NPRI and CACs is available at [www.ec.gc.ca/pdb/npri/](http://www.ec.gc.ca/pdb/npri/) and [www.ec.gc.ca/pdb/ape/](http://www.ec.gc.ca/pdb/ape/), respectively.

## Ambient Air Monitoring

### National Air Pollution Surveillance (NAPS)

The NAPS Network was established in 1969 as a way for the federal and provincial governments to work together on gathering and measuring accurate air quality data. The data are used to evaluate the progress of air pollution controls and to help direct future actions.

Under NAPS, the National Air Toxics Monitoring Program measures PM, ozone, precursors to PM and ozone, and other pollutants. This monitoring, mainly in urban areas:

- provides data on trends in air concentrations of pollutants,
- measures precursors and other components of smog,
- characterizes potential toxic components of PM,
- identifies and characterizes major sources of toxic air pollutants in long-range transport, and
- provides improved information on the fate of all these substances in the environment.

Over the years, the NAPS Network has produced one of the largest and most geographically diverse databases of pollutants in Canada. Over a four-year period, \$22 million is being invested in NAPS by the Government of Canada. The result will be improvements to measurement protocols, techniques, equipment and better support to various national programs.



## Corporate Smog Action Plan

The Government of Canada is working to reduce emissions of smog precursors from its operations through the Corporate Smog Action Plan (CSAP). The CSAP is a joint program of Environment Canada, Health Canada, Public Works and Government Services Canada, and was delivered to all 28 federal government departments and agencies with operations in Ontario. The CSAP was piloted at Environment Canada – Ontario Region's Downsview facility in 2001, and it was fully implemented in 2002. Based on survey results during smog advisories, over one-third of those surveyed used alternative modes of transportation, such as carpooling; approximately two-thirds avoided using small gas engines, such as lawnmowers and leaf blowers; approximately half stopped using solvents and pesticides; over three-quarters did not refuel their cars between 8 a.m. and 8 p.m.; and nearly two-thirds lowered or turned off their air conditioners during smog days. *Actions taken by the staff at the Downsview facility in summer 2002 resulted in a reduction of approximately 3000 kilograms of pollutants.*

These improvements will include:

- the addition of new instruments at existing sites to better measure substances of interest, such as PM,
- infrastructure upgrade at existing sites, and replacement of ageing equipment, where necessary, and
- the expansion of the network, by adding 20 new sites.

In 2000/01 and 2001/02, there were 42 new and replacement ozone monitors, 37 new and replacement NO<sub>x</sub> monitors, 25 continuous PM<sub>2.5</sub> monitors, and 23 replacement PM dichotomous samplers added. In addition, seven new speciation samplers were brought on-line for chemical sampling.

Currently, negotiations are under way with the provinces and territories on an MOU for the NAPS program, suggested by the Commissioner for the Environment and Sustainable Development in his 2000 annual report. The agreement, soon to be signed, ensures sharing of information among Environment Canada, the provinces, and the territories.

In support of the NAPS Network quality assurance program, monitoring stations were audited in a number of areas across the country, 16 calibrators were certified, and technical assistance was provided to provinces and territories.

Additional information on NAPS is available at:  
[www.etc-cte.ec.gc.ca/naps/](http://www.etc-cte.ec.gc.ca/naps/)

## Canadian Air and Precipitation Monitoring Network (CAPMoN)

The Canadian Air and Precipitation Monitoring Network (CAPMoN) is an Environment Canada network that complements NAPS in providing measurement data essential to understanding air quality problems in Canada.

Led by the Meteorological Service of Canada at Environment Canada, CAPMoN is a non-urban air quality monitoring network with siting criteria designed to ensure that the measurement locations are regionally representative (not affected by local sources of air pollution). Scientists involved with the measurement of atmospheric pollution in urban centres would consider most CAPMoN sites to be remote and relatively pristine. There are currently 19 measurement sites in Canada and one in the United States to ensure compatibility of measurement methods between U.S. and Canadian networks.

The following plan enhancements of the CAPMoN program for the assessment of regional smog are now being implemented:

- refurbishment of ozone monitors at seven CAPMoN sites,
- enhanced measurements of smog-related constituents at five sites along the Canada-U.S. border,
- addition of PM<sub>2.5</sub> and PM<sub>10</sub> measurements, as well as PM<sub>2.5</sub> speciation,
- enhancement of nitrogen compound measurements at two sites,
- real-time VOC measurements at one site,
- ongoing ozone and PM chemistry measurements at seven CAPMoN sites and VOC measurements at two sites,
- an intensified sampling campaign for PM chemistry in southern Ontario, started as part of the U.S. Supersites study, to characterize PM constituents and develop better methods for determining PM source-receptor relationships, and
- planning for a number of additional intensified sampling studies that will address some of the outstanding questions related to transboundary transport of smog and will lead to improved model verification, as well as better source-receptor relationships for PM.

Additional information on CAPMoN is available at:

[www.msc-smc.ec.gc.ca/capmon/](http://www.msc-smc.ec.gc.ca/capmon/)



## Canadian Environmental Protection Act, 1999

Since the publication of the Government of Canada's *Interim Plan 2001 on Particulate Matter and Ozone*, there have been several regulatory initiatives under CEPA 1999.

In May 2001, PM<sub>10</sub> was added to Schedule 1 of CEPA 1999. On July 2, 2003, the federal government also added the precursors to PM<sub>10</sub>, and ozone and its precursors, to Schedule 1. The reason for adding the precursors to PM<sub>10</sub> and the precursors to ozone to Schedule 1 of CEPA 1999 is that up to two-thirds of fine PM (PM<sub>2.5</sub>) and almost all of ground-level ozone is formed in the atmosphere from gaseous precursors. The precursors to PM<sub>10</sub> are identified as sulphur dioxide, nitric oxide, nitrogen dioxide, gaseous ammonia, and VOCs. Precursors to ozone are identified as nitric oxide, nitrogen dioxide, and VOCs. By adding PM<sub>10</sub> and its precursors and ozone and its precursors to Schedule 1 of CEPA 1999, the federal government is putting in place the authority it needs to take action to meet its domestic commitments on clean air. In order to deliver on these commitments, the federal government needs access to all "CEPA tools", which are only available if a substance is listed on Schedule 1.

Information on the addition of PM<sub>10</sub>, its precursors and ozone and its precursors to Schedule 1 of CEPA 1999 is located on the CEPA Environmental Registry at:  
[www.ec.gc.ca/CEPAregistry/](http://www.ec.gc.ca/CEPAregistry/)

## Canadian - US Air Quality: Border Air Quality Strategy

On June 23, 2003, Canada and the United States announced air quality projects under the *Border Air Quality Strategy*. The two countries will increase their cooperation to reduce cross-border air pollution by undertaking three major pilot projects that enable greater opportunities for coordinated air quality management between both countries. The three projects which will be launched are:

- In southwestern British Columbia and northwestern Washington State, the Georgia Basin/Puget Sound International Airshed Strategy will identify measures to reduce air emissions and address transboundary pollution;
- For southeastern Michigan and southwestern Ontario, the Great Lakes Basin Airshed Management Framework will explore the development of a coordinated airshed management approach; and,
- A joint study will explore the feasibility of emissions trading for NO<sub>x</sub> (nitrogen oxides) and SO<sub>2</sub> (sulphur dioxide). NO<sub>x</sub> and SO<sub>2</sub> emissions are key contributors in smog, fine particle and acid rain problems, in the transboundary region.

The joint projects will be completed in cooperation with provincial, state and other stakeholders. The identification of the pilot projects fulfills a pledge made by the two countries in January 2003, under the *Border Air Quality Strategy*.

Background information on the *Canada-United States Border Air Quality Strategy* is available at:

[www.ec.gc.ca/canada\\_us/air/index\\_e.htm](http://www.ec.gc.ca/canada_us/air/index_e.htm) or [www.epa.gov](http://www.epa.gov)



# Future Area of Focus – Volatile Organic Compounds (VOCs)

VOCs are precursor pollutants contributing to the formation of both ground-level ozone and PM. Throughout the country, VOC emissions originate from human activity and natural sources; in more populated and industrialized areas, the emissions from human activity predominate. The major sources of VOCs from human activity are the transportation sector, upstream oil and gas, consumer and commercial products that contain solvents, some industrial and commercial processes, and residential wood combustion. In the Interim Plan 2001, the Government of Canada committed to development of a federal action plan to reduce VOC emissions from products containing solvents.

## Burn It Smart

Led by Natural Resources Canada, Burn It Smart is designed to help Canadians understand the safety, health, and environmental issues associated with woodsmoke. With a Fall 2002 launch in 28 regions of the country, Burn It Smart encourages Canadians who burn wood to improve their burning habits and identify appliances that reduce woodsmoke emissions. Burn It Smart is one of the first federal programs that brings together climate change and clean air by asking Canadians to reflect on the cycle of wood heating from tree to chimney.

In October 2002, consultations began on a draft *Federal Agenda for Reducing VOC Emissions from Consumer and Commercial Products*. Following consideration of stakeholder comments, the final Federal Agenda will be published as a Notice of Intent in the *Canada Gazette* in 2003. The Federal Agenda will outline a mix of regulatory and voluntary actions to be taken by the federal government to address this emission source over the 2003-2010 timeframe. In order to deliver on these commitments, the federal government needs access to all "CEPA tools", which are only available if a substance is listed on Schedule 1.



New CEPA 1999 guidelines for VOCs in consumer products were published in the *Canada Gazette* on November 23, 2002, and constitute important early action by Environment Canada in addressing VOC-containing products. The VOC content limits for the 22 categories of consumer products in the CEPA 1999 guidelines are consistent with the U.S. EPA regulations for these products.

An MOU currently exists between the Canadian Chemical Producers' Association (CCPA), the Government of Canada, the Government of Ontario, and the Government of Alberta. The MOU came into effect in June 2001 (and expires on December 31, 2005). The objective of the MOU is the prevention and reduction of the release of toxic and other chemical substances through voluntary, non-regulatory action under the CCPA Responsible Care Program. It includes an Annex for the reduction of VOCs, with specific reduction targets and timelines. There are 25 CCPA member companies participating in the VOC Annex, with its national reduction target of 50% (15,226 tonnes) by 2002, using 1992 as a base year. As of 2001, CCPA member companies had achieved 90% of that target, reducing VOC emissions by 13,700 tonnes.

In addition, since the Interim Plan 2001, national standards and guidelines have been developed under the CCME NO<sub>x</sub>/VOC Management Plan for reducing VOCs from industrial maintenance coatings and automotive parts coatings operations. A national standard and guidelines for the reduction of VOC emissions from Canadian wood coating operations are currently being developed.

Information on these national standards and guidelines is available on the CCME website at: [www.ccme.ca](http://www.ccme.ca)

## EnviroClub as a Stewardship Leader

In Quebec, partnerships were formed (EnviroclubMO) between small and medium-sized manufacturing companies to inform them of the advantages of pollution prevention and enable them to implement a technical program for source reduction. In 2001, 18 small and medium-sized enterprises (SMEs) joined EnviroclubMO and the environmental results have been highly encouraging, consisting of a 4,396 kg drop in VOC emissions and a 59,117 tonne drop in greenhouse gases.

# Other Clean Air Highlights

## Federal House in Order Initiative

The Federal House in Order initiative is the Government of Canada's plan for reducing greenhouse gas emissions within its own operations. These reductions frequently bring the co-benefit of reduced pollutants that affect air quality. Under the Federal House in Order, 11 departments and agencies responsible for 95% of federal emissions have agreed to collectively meet a specific greenhouse gas target reduction of 31% from 1990 levels by 2010. Between 1990 and 2000, the total greenhouse gas emissions from Government of Canada operations declined by approximately 21%.

To encourage further emissions reductions within federal government operations, all departments, agencies, and Crown corporations are challenged through the Federal House in Order to join the Leadership Challenge, implement a greenhouse gas reduction program of their own design, and voluntarily report on results.

Here are some of the results under the Federal House in Order that reduce greenhouse gas emissions and bring clean air benefits:

- In 2000, federal departments purchased some 180 alternative fuel vehicles, a 5.5% increase from the previous year. These vehicles emit fewer greenhouse gases and fewer ozone precursors.
- All departments will purchase vehicles that are among the most energy efficient in their class or ensure that new vehicles are equipped to run on natural gas, propane, or E-85 gasoline (gasoline that contains 85% ethanol).
- Employee commuting and business travel generate substantial emissions of greenhouse gases and other air pollutants. Since 2001, Transport Canada has been leading the Outside Emissions Reduction Program to help federal departments and agencies reduce transportation emissions by promoting employee use of public transit, carpooling, walking, cycling, and teleworking. The program also addresses business travel issues such as telecommuting and video-conferencing.

- The Government of Canada Employee Transit Pass Pilot Project is designed to reduce emissions and provide employees with a convenient annual transit pass. The project began in the fall of 2002 and involved employees at Transport Canada, Environment Canada, Treasury Board Secretariat, and Natural Resources Canada. Employees from these departments in the Ottawa area who use transit receive the equivalent of 15% off regular fares or one month's fare for free, depending on where they live.

Other government-wide initiatives include the following:

- Agreements to purchase renewable energy have been completed in Saskatchewan and Prince Edward Island. Additional agreements are under negotiation to increase the overall annual emission reduction impact of renewable energy to 235 kilotonnes by 2005/06. Renewable energy supplies all the electricity requirements in the Alberta facilities of Environment Canada and Natural Resources Canada.





## Working with Industry

Environment Canada's Prairie and Northern Region participates in projects to address flaring/venting of natural gas. The work of the flaring/venting team has resulted in a significant decrease in the amount of natural gas that is flared in Alberta, with a resulting decrease in emissions of greenhouse gases and major air pollutants (sulphur dioxide, NO<sub>x</sub>).

- Some federal buildings still using heavy fuel oil in central heating plants are being encouraged by Environment Canada's Prairie and Northern Region and Atlantic Region to switch fuels to either light oil or natural gas, where available. If and when successful, this will substantially reduce sulphur dioxide and PM emissions.
- The Department of National Defence (DND) has converted from fuel oil to natural gas at Canadian Forces Base Gagetown. At Gagetown, the result is a significant decrease in sulphur dioxide emissions. Twenty-four bases are now heated by natural gas, replacing the need for "dirty fuel." In addition, 14 bases have implemented Energy Performance Contracts, which reduce energy consumption and greenhouse gas emissions.
- Vehicle exhaust socks are being used in a number of DND buildings to reduce emissions from vehicles within buildings such as large garages and storage structures. These portable or fixed filtration devices are used while moving vehicles in or out of buildings, the result being cleaner air and healthier workers.
- Public Works and Government Services Canada, as one of the largest federal departments, has conducted a building energy use assessment to identify potential emission reduction opportunities. The assessment has led to an emission reduction strategy and three-year action plan, with emissions to be 19% below 1990 levels by 2010.

Further information on the Federal House in Order initiatives is available at: [www.fhio.gc.ca](http://www.fhio.gc.ca)

## Anti-Idling Campaigns

Environment Canada and Natural Resources Canada have designated no-idling zones at some of their buildings, and the Department of National Defence has instituted a no-idling policy at all of its bases.

## Science

The science of clean air is essential to understanding the effects of pollutants on human health and the environment. It also contributes to understanding how pollutants travel through the atmosphere and interact with other chemical processes and weather conditions.



Science also determines sources of pollutants, so that actions can be effectively targeted. The knowledge is also used to determine if strategies on clean air are working. In addition, scientific advancements are helping with predicting air quality episodes so that Canadians can take action to protect themselves. For instance:

- Environment Canada continues to be a world leader in the field of operational air quality modelling, with its CHRONOS system. In 2002, further model upgrades brought improved information on fine particulate levels to support daily air quality forecasting.
- In May 2001, the Meteorological Service of Canada published *Precursor Contributions to Ambient Fine Particulate Matter in Canada*. This assessment was undertaken to summarize the current knowledge of the contribution of gaseous precursors to secondary particle formation in Canada and to provide a scientific basis for the development of risk management options for ambient PM.

- On the west coast, an international air quality field study, Pacific 2001, was successfully completed in 2001, involving 130 scientists from Environment Canada, various other government agencies and departments, and 14 universities. The study gathered important information on the nature, formation, and transport of fine PM and other smog components.
- A computer modelling system to estimate concentrations of ground-level ozone and fine PM is being applied to the Pacific Northwest in partnership with U.S. agencies. The initial application of the modelling system will be the Georgia Basin/Puget Sound. The study area will be expanded to reach the full 500-kilometre area within the Canada/U.S. border region and will include the Okanagan Valley in south-central British Columbia.
- In Atlantic Canada, Environment Canada operates an ozone and PM network, while providing support for provincial ozone and PM measurements. Important insights have been gained on the impacts of PM and ozone on human health through air quality-health impact models and the preparation of a test case for southern New Brunswick.
- Determining the impacts of Ontario and U.S. pollutants on Quebec air quality is part of the work under way in Environment Canada's Quebec Region, with a number of field studies.

## Agriculture and Clean Air

The Government of Canada, along with provincial and territorial governments and the agriculture and agri-food industry, is developing a comprehensive agricultural policy for the agri-food sector. The Agricultural Policy Framework proposes areas where governments can improve links between agriculture and the environment, the development of best management practices, and stepped-up action on environmental priorities on farms through agri-environmental scans and environmental farm plans. One of the environmental outcome goals is to reduce agricultural risks and improve the quality of the air and the atmosphere. The key priorities in this area are:

- to reduce emissions of airborne contaminants from agricultural sources, such as ammonia, harmful PM and volatile substances, and emissions of gases that contribute to global warming, and
- to limit the impact of climate change and atmospheric pollutants on agricultural production.

## Biobus

In March 2002, 155 Montreal city buses began using a fuel called B20 (diesel with 20% biodiesel content). By the time the project was over in February 2003, the biobuses had travelled almost 7,000,000 kilometers and reduced greenhouse gas emissions by 2100 tonnes and fine particulate matter by 20%. The Biobus project proved that biodiesel is a viable, practical alternative fuel, especially for use in cold climates. Another objective of the Biobus project was to assess the technical, economic and environmental impact of biodiesel fuel on urban transportation. There were about a dozen partners in this project, including the federal and provincial governments, associations, an industry and the Montreal transit authority, *Société de transport de Montréal*, which shared the project costs, estimated at \$1.3 million. For more information, visit [www.stm.info/English/a-somm.htm](http://www.stm.info/English/a-somm.htm)

- Research and development to increase the understanding of linkages between agriculture and air quality have been conducted for some years within Agriculture and Agri-Food Canada. For example, scientific studies have been carried out on fine dust, herbicide volatilization, and ammonia emissions associated with agricultural practices. The deposition of tropospheric ozone on field crops over a region was also quantified. Research efforts on the emission of airborne contaminants from agricultural sources, particularly on PM and gaseous ammonia as a precursor of PM, will continue to support efforts towards the Agricultural Policy Framework in this area.
- Regarding the risk management of gaseous ammonia as a precursor to PM<sub>10</sub>, the federal government's risk management approach for the next three to five years will include: (a) moving forward with reduction of the other precursors (NO<sub>x</sub>, VOCs and SO<sub>2</sub>); (b) tracking and monitoring information on the distribution of gaseous ammonia and on the relationship between it and the other precursors; (c) work with other federal government departments on science and management measures; and, (d) support to voluntary and provincial/territorial risk management efforts. With respect to the measures to be taken, Environment Canada will work closely with Agriculture and Agri-Food Canada and stakeholders including the provinces and territories and the agricultural sector. It will be particularly important that the agricultural sector support and participate in the responsible and flexible substance-management approach

that Environment Canada will develop with Agriculture and Agri-Food Canada under the Agricultural Policy Framework.

- The AIRNOW ozone mapping project, which shows real-time and forecast ozone levels, is produced in collaboration with the U.S. EPA, Environment Canada, and provincial jurisdictions in eastern Canada. A similar project is under development for PM.
- In the Prairie and Northern Region, the first phase of the oil sands Ozone Formation Study has been completed.
- The STIFS (Supersite Transboundary Intensive Field Study) is undertaking intensive PM measurements in southern Ontario and southwestern Quebec (Montreal and St-Anicet sites).
- Collaborative modelling work between Environment Canada and the Ontario Ministry of the Environment is developing modelling expertise and exploring the impacts of various emission reduction scenarios.
- Established by Environment Canada in 2000, the Canadian Foundation for Climate and Atmospheric Sciences has now invested \$35 million in university-based activities to provide scientifically sound answers to atmospheric environmental problems. Over \$22 million of this investment contributes to the training of the next generation of research scientists.

## Partners, Engagement, and Outreach

As air issues management in Canada is shared among jurisdictions, actions must also be taken by communities and individuals. There has been significant activity to engage Canadians to take action on clean air. An important component is the air quality forecasting that allows people in regions to understand more about the pollutants that affect them, while promoting protection measures during air quality episodes.



Joint initiatives and outreach programs include the following:

- Clean Air Day Canada, celebrated every year on the Wednesday of Environment Week, provides a focal point for local and national activities promoting clean air and climate change awareness and actions. Over the last few years, Clean Air Day Canada has focused on encouraging Canadians to reduce their emissions by adopting sustainable modes of transportation and has involved partnerships with national, provincial, and local organizations.
- The federal government is working with partners to promote individual and collective actions. Canadians are being engaged through local summertime air quality forecasts in British Columbia, Ontario, Quebec, and Atlantic Canada, providing information to more than 60% of the Canadian population. In addition, two multi-stakeholder workshops have produced both short- and long-term recommendations for moving forward with the development of a multi-pollutant health-risk-based Air Quality Index, or AQI.
- Environmental organizations are learning more about ground-level ozone studies and smog through outreach in the Annapolis River area, Cape Breton, Eastern Charlotte Waterways, and Saint John.

## Cooperative Work on PM

Canada and the United States have continued their cooperative efforts to address PM as an outgrowth of the Joint Plan of Action signed in April 1997 by the environment ministers. Over the past two years, Canada and the United States have developed a plan to undertake joint analysis necessary to characterize the transboundary PM issue. Their objective is to issue a report on the transboundary PM issue to the Canada-U.S. Air Quality Committee, the implementation arm of the Canada-U.S. Air Quality Agreement, and to use that report as one of the elements upon which to make a decision on whether to develop a PM annex to the Air Quality Agreement.

*Progress on the Canada-U.S. Air Quality Agreement is reported on a biennial basis. The 2002 Progress Report can be obtained at:*

[www.ec.gc.ca/air/qual/2002/index\\_e.html](http://www.ec.gc.ca/air/qual/2002/index_e.html)



- The Government of Canada established the Green Municipal Funds to stimulate municipal investments in innovative environmental infrastructure projects and practices to achieve cleaner air, water, and soil and to protect the climate. Program delivery to all Canadian municipalities is delegated to the Federation of Canadian Municipalities, which operates at arm's length from the federal government.
- An air quality module for the SkyWatchers program for the elementary/middle school level was developed by Environment Canada's Atlantic Region and distributed across the country. SkyWatchers teaches elementary school children about weather through daily observations and teaching materials.
- All of southern Quebec is now covered by the INFO-SMOG program. In summer, there are daily forecasts of ozone and advisories, if necessary. The daily forecasts are still based on ground-level ozone, but fine particle forecasts are being evaluated and could be implemented next summer if the results are satisfactory. The winter INFO-SMOG program is still only for the Greater Montreal Area and is based on fine particles.
- The Smog Summit in Toronto completed its fourth successful meeting on June 20, 2003, under the theme *Smog and Energy Use: Make the Connection*. The Summit followed up on the issues raised at the previous summit, with a continued focus on joint action by federal, provincial, and municipal levels of government to improve air quality in the Greater Toronto Area. Speakers at this year's Smog Summit included Environment Minister David Anderson, Olympic tri-athlete Sharon Donnelly, Ontario Renewable Energy Commissioner Steve Gilchrist, and the Ontario Medical Association's smog expert Dr. Ted Boadway. Representatives of four regional governments, nine towns and six cities across the Greater Toronto Area participated in a moderated roundtable session to discuss their contributions to smog reduction. In the weeks prior to the Summit, five community forums (including one industry forum) were held around the area to highlight smog and energy reduction initiatives by local businesses and community groups. The conclusion of the 2003 event included the signing of the *Toronto 2003 Inter-Government Declaration on Clean Air*. The

## Smog Forecasting Leadership

Smog forecasting began in Atlantic Canada in 1993 under the leadership of the Meteorological Service of Canada, Environment Canada's Atlantic Region, the New Brunswick Lung Association, and provincial partners. Additional information on air quality forecasting is available at [www.msc-smc.ec.gc.ca/aq\\_smog/](http://www.msc-smc.ec.gc.ca/aq_smog/)

## Efforts to Reduce Transportation Emissions

Environment Canada, the Department of Fisheries and Oceans, Transport Canada, and the Northwest Cruiseship Association, representing the major lines on the Vancouver-Alaska run, are exploring opportunities to increase the use of low-sulphur fuels within a broader context of minimizing the impact of these ships in B.C. coastal waters.

Declaration includes commitments for the coming year that add to the list of past federal commitments made at previous Smog Summits. They represent important steps in the federal government's efforts to reduce air pollution from both the transportation and energy sectors and other sources such as Volatile Organic Compounds. For more information on the Toronto Smog Summit, please visit the following website:

[http://www.city.toronto.on.ca/cleanairpartnership/smog\\_summit.htm#forums](http://www.city.toronto.on.ca/cleanairpartnership/smog_summit.htm#forums)

- Environment Canada supports seven in-use vehicle scrappage programs in Canada, such as the Breathe-Easy Calgary Vehicle Scrappage Program. The Calgary program was very successful, reaching its target for the number of old vehicles to be scrapped in only a few months. Environment Canada also supports lawnmower scrappage, such as the Mow Down Pollution program.
- Vehicle emissions clinics held by Environment Canada and Transport Canada across the country every summer assist Canadians with vehicle checkups to determine the efficiency of anti-pollution equipment. The clinics are a significant opportunity for highlighting clean air and the transportation connection to Canadians.
- Environment Canada, Pacific and Yukon Region, hosted the Second National Workshop on Air Quality Forecasting and Applications in 2002, at which experts from across Canada, the United States, and Mexico took up the challenge to identify the impacts of unacceptable levels of air pollutants on a local, regional, and international scale. Emphasis was placed on understanding air quality issues in mountainous and coastal terrain.
- Transport Canada, as a member state of the International Civil Aviation Organization (ICAO), has been working to reduce emission reductions from the aviation sector. In November 2002, Transport Canada hosted the *International Workshop on Aviation Operational Measures for Fuel and Emissions Reductions* to disseminate information in a best practices document developed by the ICAO Committee on Aviation Environmental Protection.

The document was called *Operational Opportunities to Minimize Fuel Use and Reduce Emissions* and will soon be published as an ICAO Circular.

## Industry

As described in the list of Joint Initial Actions of the CWS for PM and Ozone, Environment Canada is working with the provinces and territories to develop comprehensive Multi-pollutant Emission Reduction Strategies (MERS) for a number of major industrial sectors (electric power generation, iron and steel, base metals smelting, pulp and paper, lumber and allied wood products, and concrete batch mix and asphalt mix plants) in Canada.

In 2001, a Clean Air Workbook was completed for the electric power generation sector, and in 2002, Multi-pollutant Emissions Reduction Analysis Foundation (MERAf) reports were completed for iron and steel, base metals smelting, pulp and paper, lumber and allied wood products, and concrete batch mix and asphalt mix plants. The Clean Air Workbook and MERAf reports will provide an important basis for the development of provincial and territorial implementation plans to achieve the CWS for PM and Ozone.

The Clean Air Workbook was the basis for discussion at a multi-stakeholder workshop in November 2001. It contains papers on emission reduction options and costs, policy instruments review, and competitiveness analysis background information, as well as key issues. The MERAf inventories the emissions from six industrial sectors, describes the control technologies and management practices available to reduce emissions, and evaluates potential emission reductions that could be derived from application of available techniques. In June 2002, multi-stakeholder, multi-jurisdictional workshops were held to discuss and receive comments on the MERAf reports.

An important benefit of the MERS process to date is the opportunity it has provided for partnership and dialogue among all levels of government, industry, public interest organizations, and other stakeholders across the country and for the identification of best practices and techniques in the selected sectors.

Federal activities in these sectors may include the development of emission standards in Environmental Codes of Practice and other initiatives for the management of toxic substances under CEPA 1999. (Additional information on MERS can be found on the CCME website at: [www.ccme.ca](http://www.ccme.ca))

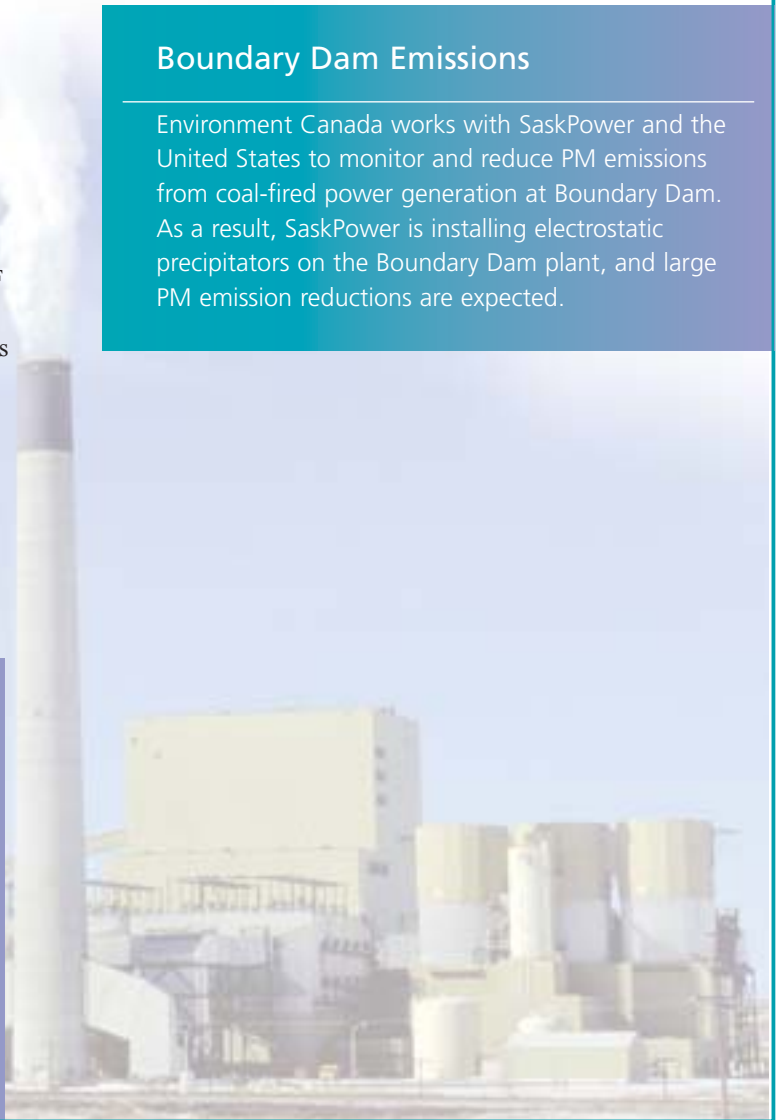
Following a one-year multi-stakeholder consultation period, the CEPA 1999 New Source Emission Guidelines for Thermal Electricity Generation were published in the Canada Gazette, Part I, in January 2003. They introduce stricter emission limits for sulphur dioxide, NO<sub>x</sub>, and PM for new coal-, oil-, and gas-fired steam-electric power plants than were contained in previous versions of the Guidelines.

## Boundary Dam Emissions

Environment Canada works with SaskPower and the United States to monitor and reduce PM emissions from coal-fired power generation at Boundary Dam. As a result, SaskPower is installing electrostatic precipitators on the Boundary Dam plant, and large PM emission reductions are expected.

## Technologies and Partnerships

The Government of Canada is working with a broad range of industrial partners, as well as the provinces and territories, to pursue the development of a refuelling infrastructure for fuel cell vehicles that emit low or no emissions. The government has invested \$23 million in the Canadian Transportation Fuel Cell Alliance to investigate different fuelling options for fuel cell vehicles and a further \$20 million for the National Research Council's fuel cell research and development at its Innovation Centre in Vancouver.



The Guidelines also include a statement of Environment Canada's intention to provide continuous updates to reflect advancements in emission control technologies and strategies. Another addition to the CEPA 1999 Guidelines is the form of the emission limit. Previous Guidelines contained input-based emission limits (i.e., allowable emissions per unit of heat energy input). The new limits are expressed in output-based units (i.e., allowable emissions per unit of electricity output). This encourages more efficient generation technology and operations by making efficiency count towards meeting emission limits. More efficient technology contributes to pollution prevention and, hence, lowers emissions of all pollutants.

## Sumas 2 Thermal Power Plant

Environment Canada, in cooperation with other Canadian agencies, has participated in the review of the proposed Sumas Energy 2 generating facility. The company initially applied to the Washington State Energy Facility Site Evaluation Council in January 1999. The department has provided technical comments on air quality concerns in Canada for the Council to consider in their deliberations on the project. Environment Canada continues to express its opposition to increases in air pollution that can undo hard-won progress in the Fraser Valley.

## Clean Air and Climate Change

Many fossil fuels that produce greenhouse gases (GHGs) when burned, such as coal and gas, also produce air pollutants that have a negative impact on the quality of the air we breathe. Some of these pollutants persist in our environment for many, many years, and some, like mercury, also accumulate in human and animal tissues, with serious, long-term effects on health. By reducing our emissions of greenhouse gases, we can begin to slow the progress of human-induced climate change and, at the same time, have a beneficial effect on the quality of our air.

### What is Being Done

As a significant contributor to both smog and GHG emissions, the transportation sector is one source of pollutants that is being addressed by both government and industry. For example, the cars and trucks on the road today are both cleaner and more fuel-efficient than 10 years ago, but problems persist. Therefore, the government has brought in regulations and policies for even cleaner vehicles, cleaner fuels, new and different fuels, more fuel-efficient technology and cleaner engines. These measures taken together will not only reduce the smog pollutants such as nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO), but also CO<sub>2</sub>.

### The Climate Change Plan for Canada

The Climate Change Plan for Canada calls on automakers to improve average fuel efficiency in their vehicles by 25 per cent by 2010. The Plan also includes measures that will significantly increase the production and use of ethanol and other cleaner-burning vehicle fuels and technologies. These and other measures in the Climate Change Plan for Canada will complement and build on existing greenhouse gas emission-reduction initiatives like the Canadian Transportation Fuel Cell Alliance and National Research Council's fuel-cell research and development. Copies of the plan are available from the Government of Canada's Climate Change web site at: [www.climatechange.gc.ca/plan\\_for\\_canada/plan/index.html](http://www.climatechange.gc.ca/plan_for_canada/plan/index.html)

Of course, meeting our climate change target will require an effort from all Canadians, and all sectors of our economy, not just transportation. That is why the Climate Change Plan for Canada outlines a role for everyone in reducing greenhouse gas emissions.





# Conclusion

The Government of Canada will continue to act, through a mixture of regulations, economic instruments, and voluntary measures, to meet its obligations under the CWS for PM and Ozone and the Ozone Annex to the Canada-U.S. Air Quality Agreement (which commits both countries to reduce emissions of ozone precursors), as well as its obligations to protect the health of all Canadians and the Canadian environment

through the provision of clean air. The federal government will also continue its partnerships with provinces, territories, industry, business, municipalities, and organizations in meeting its initiatives as set out in the Interim Plan 2001. Subsequent reports will inform the Canadian public of the federal government's ongoing progress in meeting its commitments, both nationally and internationally, to reduce levels of PM and ozone in Canada.



National Library of Canada cataloguing  
in publication data

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Main entry under title :  
Clean air in Canada: 2003 Progress Report on Particulate  
Matter and Ozone

Issued also in French under title: L'assainissement de l'air  
au Canada : Rapport d'étape de 2003 sur les particules et  
l'ozone.

Issued also on the Internet.

ISBN 0-662-34514-2  
Cat. no. En40-886/2003E

1. Air - Pollution - Government policy - Canada.
2. Particles - Environmental aspects - Canada.
3. Atmospheric ozone - Government policy - Canada.
4. Air quality management - Canada.
5. Environmental monitoring - Canada.
- l. Canada. Environment Canada.

TD883.148C3C53 2003 363.739'256'0971 C2003-980221-3

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