Federal House in Order

Annual Report on Emissions Reductions From Federal Operations

October 2003

Government of Canada Gouvernement du Canada

Canada

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October 2003

Ministers' Foreword

The Honourable Herb Dhaliwal
Minister
Natural Resources Canada

The Honourable David Anderson
Minister
Environment Canada

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Executive Summary

The Government of Canada is taking action to address climate change and is demonstrating leadership by reducing greenhouse gas (GHG) emissions within its own operations. The Federal House in Order (FHIO) initiative formally centralizes the Government of Canada's efforts to monitor, track and reduce its own emissions. Supported by lead departments Natural Resources Canada and Environment Canada, the initiative involves 11 departments and agencies that together account for an estimated 95 percent of all Government of Canada emissions.

The *Annual Report on Emissions Reductions From Federal Operations* is under the FHIO initiative and meets the Government of Canada's commitment to report annually on its progress in reducing GHG emissions. It is the eighth progress report submitted to Canada's Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.). Under this initiative, emissions data reported by federal departments are centralized in a federal GHG inventory. The resulting information was used in the April 2001 report to announce a revised Government of Canada target. This report goes beyond target setting and updates the Government of Canada's progress toward reducing its own GHG emissions by providing current emissions data for 2001.

Highlights include the following:

- The *Government of Canada Action Plan 2000 on Climate Change* announced a revised target of a 31 (30.6) percent reduction from 1990 levels by the year 2010. The Government of Canada is well on its way to achieving this target, having reduced GHG emissions from its operations by 24 (24.4) percent between 1990 and 2001.
- In 2001, about 81 percent of emissions came from facilities (i.e. buildings), 16 percent came from vehicle fleets and 3 percent came from non-energy sources.
- The Government of Canada has reduced its energy use and has switched to cleaner fuels, thereby reducing total GHG emissions by 24 (24.4) percent between 1990 and 2001.

For further information on the FHIO initiative, visit the Web site at www.fhio.gc.ca.

Study Context

1.1 Background

Greenhouse gas (GHG) emissions contribute to global climate change. These emissions are a product of the combustion of fossil fuels, such as coal, oil and natural gas, and are increasing in concentrations in the earth's atmosphere. In partnership with other levels of government, industry and energy consumers, the Government of Canada is working to limit these emissions.

In 1992, Canada ratified the United Nations Framework Convention on Climate Change (UNFCCC). In 1995, federal, provincial and territorial ministers of energy and the environment approved the National Action Program on Climate Change to demonstrate leadership in reducing GHG emissions by "getting their own houses in order." By reducing emissions related to their own operations, participants sought to encourage other sectors of the economy to do the same.

Accordingly, the Government of Canada registered its action plan with Canada's Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.) in 1995, stating its commitment to reduce GHG emissions from federal operations by at least 20 percent from 1990 levels by the year 2005. This target has since been revised under the FHIO initiative to 31 percent below 1990 levels by 2010.

In December 1997, more than 160 nations attending the third UNFCCC Conference of the Parties negotiated the Kyoto Protocol. In the fall of 2002, the Government of Canada ratified the Kyoto Protocol, agreeing to reduce Canada's GHG emissions to 6 percent below 1990 levels between 2008 and 2012.

1.2 The Federal House in Order Initiative

In 2000, the Government of Canada launched the FHIO initiative, with Natural Resources Canada and Environment Canada as co-leading departments. This initiative recognizes that the Government of Canada's operations produce GHG emissions and as a result must meet their share of the responsibility for honouring the Kyoto commitment. Through this initiative, the Government of Canada will demonstrate that it is taking a leadership role in getting its own "house in order." Reducing its own emissions may ultimately encourage others to do their part in addressing the climate change issue.

Through the FHIO initiative, the Government of Canada developed a target for reducing GHG emissions within its own operations. This target, along with a strengthened and formal reporting system to track and monitor federal emissions, was announced in the *Government of Canada Action Plan 2000 on Climate Change*. Emissions data under the FHIO initiative are based on data quantified and provided by participating departments and tracked through a central GHG inventory, promoting consistent, reliable and annual reporting.

The *Annual Report on Emissions Reductions From Federal Operations* (ERFO) is the FHIO initiative's annual report. Its objective is to report on the Government of Canada's progress toward achieving its emissions-reductions target. This report also meets the Government of Canada's commitment to VCR Inc. to report annually on its progress in reducing emissions. This is the eighth report submitted to VCR Inc., and the third since the commencement of the FHIO initiative.

Setting Emissions-Reporting Boundaries

Setting and defining boundaries for collecting GHG emissions data for the federal GHG inventory promotes the collection of consistent and reliable data. These boundaries recognize the challenges and current limitations to collecting data across federal departments and serve to clearly identify the scope of emissions included in the inventory. The scope of emissions included in the inventory is expected to increase as data infrastructure improves across the Government of Canada.

The following identifies the GHG inventory boundaries for emissions sources and types and GHGs.

2.1 Participating Departments

Eleven departments report data to the FHIO initiative's GHG inventory. These departments have been identified as the largest contributors of GHG emissions. Through the FHIO initiative's Leadership Challenge, other departments and agencies are being recruited to participate.

Table 1. Federal Departments Reporting to the FHIO Initiative's GHG Inventory

Agriculture and Agri-Food Canada
Correctional Service Canada
Department of National Defence
Environment Canada
Fisheries and Oceans Canada
National Research Council Canada
Natural Resources Canada
Parks Canada Agency
Public Works and Government Services Canada
Royal Canadian Mounted Police
Transport Canada

2.2 Emissions Sources

The most significant source of GHG emissions from federal activities comes from the combustion of fossil fuels. The combustion of fossil fuels – whether direct (consumed at source) or indirect (consumed upstream such as in the generation of electricity) – results in GHG emissions attributed to a variety of gases. Increasing concentrations of GHGs in the atmosphere result in climate change. The FHIO initiative collects data on the three most prevalent GHGs: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

In addition to GHG emissions from the combustion of fossil fuels, non-energy sources, such as landfills and agricultural operations, also emit GHGs. Currently, the amount of GHG emissions from non-energy sources are an estimate. A methodology to account for these emissions will be included in future reports. The Government of Canada as an organization emits GHGs primarily from federal facilities and vehicle fleets. These sources are now captured in the federal GHG inventory.

■ 2.2.1 FACILITIES

Facilities largely refer to building infrastructure such as office buildings, laboratories and warehouses. The main criterion for including facilities in the GHG inventory involves the custodial responsibility of the building. Emissions data are collected only for those facilities for which the Government of Canada has custodial responsibility and therefore direct control and influence over curbing future emissions.

2.2.2 FLEETS

Fleet emissions sources encompass the on- and off-road federal fleets. The on-road fleet includes a variety of cars, vans, trucks and other vehicles that the Government of Canada owns/leases and operates for on-road travel. The off-road fleet includes a wide variety of vehicles and equipment used in federal operations. Within the off-road category is a marine fleet, which includes the boats and ships owned by the Government of Canada. Aircraft are also included in the off-road category, as are field equipment such as all-terrain vehicles, lawn mowers and generators.

2.3 Emissions Sources Outside the Scope of the FHIO Initiative

The FHIO initiative's GHG inventory tries to include all sources of GHG emissions from its operations. However, a few sources currently fall outside the scope of the inventory. Efforts are being made to broaden the scope to include the following emissions sources.

Non-Participating Departments

Not all federal departments and agencies are included in the inventory. The 11 departments (as shown in Table 1) that are now reporting data to the FHIO initiative's GHG inventory represent about 95 percent of the Government of Canada's emissions. The remaining departments are actively being recruited through the Leadership Challenge. An update on the activities of the Leadership Challenge can be found in Chapter 6.

Crown Corporations

Although Crown corporations are not included in the FHIO initiative's GHG inventory, several have started their own reduction strategies. For example, Atomic Energy of Canada Limited, Petro-Canada and VIA Rail Canada Inc. have each submitted action plans to VCR Inc. Given the relationship between the Government of Canada and Crown corporations, there is great interest in eventually expanding the data collection for the inventory to include emissions associated with Crown corporations that have not already submitted action plans to VCR Inc.

National Safety and Security Sources

National Safety and Security (NSS) emissions from activities such as search-and-rescue operations and military vehicles are excluded due to the important role these functions have in ensuring the safety and security of Canadians. These emissions are exempt from the federal emissions tracking and target-setting exercise so as to not impair the Government of Canada's role in providing these services. They will also be exempt until emissions associated with these sources are addressed through international protocols. Departments identifying NSS emissions have been asked to track these emissions independently and to make best efforts to reduce them.

"Outside" Emissions

Other related emissions that are a consequence of the activities of the Government of Canada are not reported in the inventory. These are often referred to as "outside" emissions. They include emissions from employee commuting, business travel and government activities that are outsourced. Some initial scoping has been done on the impact of outside emissions. The progression of this work may be integrated into future ERFO reports if it is developed to a stage where data collection and a related infrastructure are in place for an annual collection on this group of emissions.

Nevertheless, activities are underway to reduce such emissions under the Leadership Challenge (see Section 6.2). For example, a pilot test of the transit pass system has been launched in the National Capital Region. Through payroll deductions, federal employees can purchase a monthly public transit pass at a reduced rate. This reduces GHG emissions by encouraging the employees to leave their cars at home and use public transportation.

2.4 Divestiture

The intent of the FHIO initiative is to reduce GHG emissions. This will be done by investing in emerging renewable resources (e.g. wind-generated power), switching to cleaner fuels and replacing old technologies with newer, more efficient ones, such as energy-efficient boilers. The Government of Canada will not take credit for emissions reductions if facilities are sold and their emissions are divested to other sectors of the economy. Credit can be given only if a building is decommissioned via downsizing. Any emissions associated with the divesting of assets since 1998 will be taken out of the Government of Canada baseline to ensure that they are not being included in the Government of Canada's emissions reductions to date.

2.5 Emissions Types

The data collected in the GHG inventory encompass direct, indirect and non-energy GHG emissions. Direct emissions are a result of the combustion of fossil fuels by the federal fleet and facilities. Indirect emissions result from the purchase and use of electricity and steam, primarily for facilities. Non-energy emissions from landfills and agricultural operations are now accounted for in the GHG inventory. However, their quantification is based on a scoping study, and the annual collection of this data is not yet feasible. A process is being developed to start collecting this data annually for the GHG inventory.

2.6 Greenhouse Gases

In this report, the federal GHG footprint is described in terms of total CO_2 equivalent (CO_2e). CO_2e is an aggregate GHG emissions unit composed of a global warming potential (GWP) weighted values for CO_2, CH_4 and N_2O (see Table 2). A summary of the 2001 GHG emissions by gas type is available in Appendices A and B.

Table 2. Greenhouse Gases and Their Global Warming Potential

Greenhouse Gas		GWP
Carbon dioxide	(CO_2)	1
Methane	(CH_4)	21
Nitrous oxide	(N_2O)	310

Estimating GHG Emissions

The method for estimating the Government of Canada's GHG emissions has evolved over the years. The first versions of this report were based on a combination of departmental reports and estimates derived from a modelling exercise. The commencement of the FHIO initiative led to a major shift in methodology toward the collection of energy consumption data from departments. The energy consumption data are the basis for producing estimates of GHG emissions.

The FHIO initiative's methodology for producing GHG emissions estimates continues to evolve over time, conforming with VCR Inc. and the Greenhouse Gas Protocol Initiative's reporting standards identified by the World Resources Institute.

The following general steps are used to produce GHG emissions estimates.

3.1 Step 1: Data Collection

Departments are responsible for their annual data collection and reporting to the FHIO initiative's GHG inventory. Annual data collection is aided by the GHG inventory's data collection tools (see Appendix C). The departments report energy consumption by fuel type for facilities and fleets. Non-energy-related emissions data are not yet reported to the inventory. However, this is now being addressed, and a non-energy data collection tool is in development.

The data collection tools available to the departments calculate GHGs based on the amount of fuel used over the course of one fiscal year (April to March). Each department submits aggregated data to the FHIO initiative's GHG Inventory for all of their facilities and fleets located across the country.

Departments are constantly developing their data collection systems and incorporating their environmental management and financial systems. These efforts are resulting in timely and accurate data.

3.2 Step 2: Data Validation

The personnel who manage and administer the GHG inventory validate departmental data relative to what has been reported in the past, identifying anomalies in the data and contacting departments for further explanation or correction of reported data when necessary. Data is compared with related reporting activities in the Government of Canada by outside experts in federal fleet and building emissions.

3.3 Step 3: Emissions Calculations

Estimating the emissions for the Government of Canada involves applying GHG coefficients to the fuel consumption reported by federal departments to the FHIO initiative's GHG inventory. GHG coefficients exist for the various fuel types in the market. Appendix D identifies the GHG coefficients used by the FHIO initiative.

The GHG inventory collects fuel use by fuel type. Therefore, calculating associated GHG emissions involves applying the appropriate coefficients to each fuel type. This process is automated in the inventory's data collection tools. When information on fuel use is reported, the resulting emissions are calculated in the reporting tool for the department.

Setting a Federal Target

This section identifies the federal target and details the process for establishing a federal emissions-reduction target. This includes aspects of the baseline data and the process for compiling emissions data for the two important reference time frames for the target-setting process in the Kyoto Protocol. Essentially, this involved establishing emissions levels for 1990 and 2010, given that the protocol requires emissions to be below 1990 levels between 2008 and 2012.

The following steps were followed to establish a new federal emissions target.

4.1 Step 1: Establishing and Revising Baseline Data for 1998

Baseline data are the basis for all federal emissions and emissions-target calculations. Any change to the baseline data set will ultimately affect all subsequent data. The first year of data collection reported to the GHG inventory under the FHIO initiative was 1998. It is therefore the baseline year. That year, the Government of Canada's emissions were 3102 kilotonnes (kt) of carbon dioxide equivalent (CO_2e).

The quality of the data that departments collect is always improving. By investing in better data collection systems, some departments have been able to resubmit past data to the FHIO initiative's GHG inventory. Other scenarios require corrections to baseline data, as more accurate accounting methodologies have identified assets not previously included in the inventory. GHG emissions associated with divestiture also affect historical data. Therefore, the baseline needed to be adjusted.

Due to an improved data infrastructure, this report is the first of the annual reports to change the 1998 baseline; future reports will incorporate baseline changes as required. The new baseline for 1998 is 3184 kt of CO_2e. This represents an 82-kt change from the baseline reported in last year's report. Due to the change in baseline, GHG emissions in 1990 and 2010 had to be recalculated. The remaining steps explain how this was done.

4.2 Step 2: Backcast to the 1990 Reference Year

Under the Kyoto Protocol, 1990 is the reference year from which all subsequent emissions levels are compared. Similarly, this is the reference year for the FHIO initiative and for referencing the Government of Canada's GHG emissions target and for reporting progress toward reaching that target.

Given that the quantifiable data needed to establish the 1990 reference year are not available from all departments, the 1990 reference was backcast from the 1998 baseline year. Information on Government of Canada downsizing, energy intensity improvements and fuel switching between 1990 and 1998 and reported information in previous ERFO submissions were used to backcast a 1990 emissions level for the Government of Canada. As a result, federal emissions were estimated at 3950 kt of CO_2e in 1990.

4.3 Step 3: Forecasting Emissions Levels in 2010

The time frame for attaining the Kyoto Protocol target levels is between 2008 and 2012. Departments projected their emissions levels to 2010, the midpoint for this target reference time frame, assuming a business-as-usual scenario in which no new actions are taken to reduce emissions.

Projected emissions estimates are based on planned growth in floor space that departments and agencies reported in their capital plans. It is assumed that, between 1998 and 2010, new buildings will be constructed using current building practices and at current performance levels. For the building stock existing in 1998, it is assumed that the efficiency will remain largely unchanged in the absence of measures by the FHIO initiative. It is also assumed that GHG emissions from vehicle fleets will remain relatively constant in the absence of Government of Canada measures.

Cumulatively, the Government of Canada's emissions are estimated to increase by 2.5 percent between 1998 and 2010 under a business-as-usual scenario. Federal emissions would therefore reach 3263 kt of CO_2e by 2010 if no actions to reduce emissions were taken. The business-as-usual forecast becomes the basis for calculating an emissions target, as the identified emissions-reduction potential is subtracted from this base case.

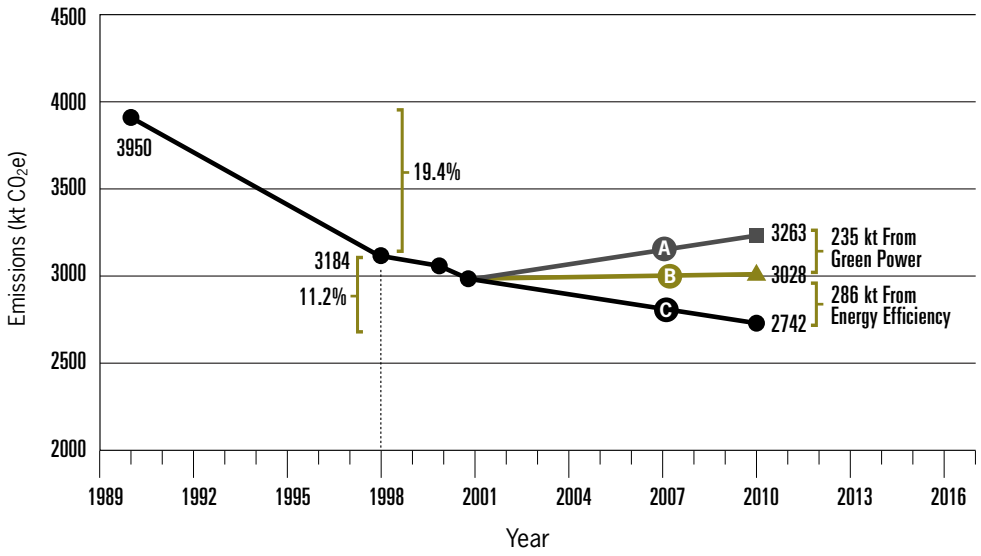
4.4 Step 4: Calculating an Emissions Target for 2010

Departments assessed a variety of cost-effective measures to improve energy efficiency and emissions levels in their respective departments between 1998 and 2010. In addition, the Government of Canada is proposing to reduce emissions by using renewable energy from proposed renewable energy projects.

The emissions reductions to be achieved through departmental energy efficiency measures and the use of energy from renewable resources were subtracted from the business-as-usual scenario emissions value of 3263 kt CO_2e (see Figure 1, line A). It was estimated that emissions would be reduced by 235 kt by implementing renewable energy projects (see Figure 1, line B). The remainder of the estimated emissions reduction will be 286 kt. This will be achieved collectively through departments' individual energy management plans and emissions-reduction activities (see Figure 1, line C). In total, the Government of Canada estimates that it will reduce its emissions by 521 kt from the 2010 business-as-usual scenario.

Emissions for the Government of Canada are projected at 2742 kt of CO_2e in 2010, given the planned emissions reduction of 521 kt from the 2010 business-as-usual scenario (3263 kt). The federal target is therefore to reduce GHG emissions by 31 (30.6) percent from 1990 levels.

Figure 1. Target for the Government of Canada



Progress Toward Achieving the Federal Target

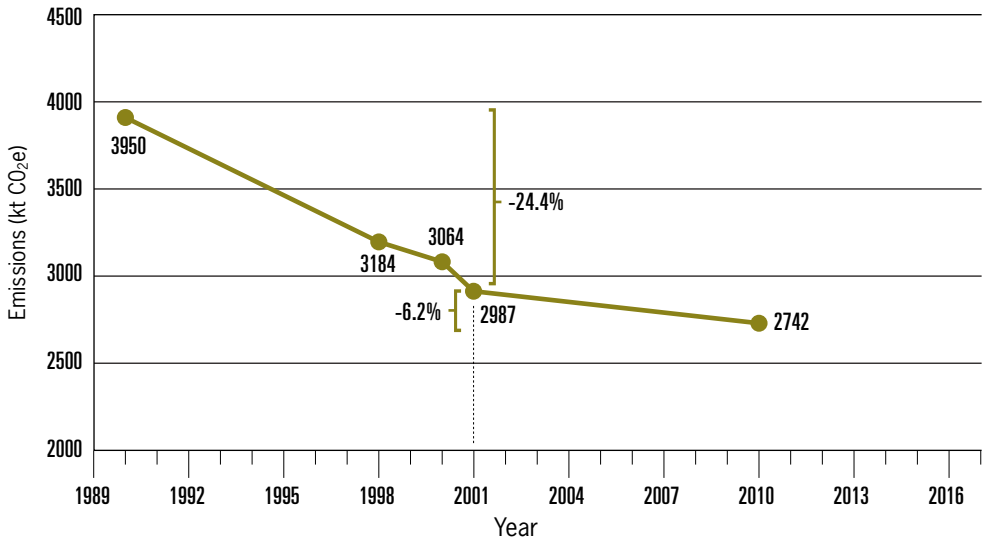
The main objective of this ERFO document is to report the Government of Canada's progress toward achieving its target. This chapter profiles the characteristics of the most recent year's data collection and outlines progress based on the 2001 emissions data. It also provides, where possible, an explanation of the federal emissions situation.

5.1 Profile of 2001 Inventory

Overall, federal emissions declined 24.4 percent, from 3950 kt to 2987 kt of CO_2e between 1990 and 2001 (see Figure 2). As a result, the Government of Canada is required to reduce emissions an additional 6.2 percent between 2001 and 2010 to achieve the 31 (30.6) percent reduction target.

Figure 3 shows the reduction in GHG emissions between 1990 and 2001 by source for the 11 federal departments and agencies listed in Table 1 (on page 4). Emissions declined 766 kt, or about 19.4 percent, from 1990 to 1998. Emissions were further reduced by 197 kt between 1998 and 2001, representing an additional 5 percent reduction relative to 1990 emissions levels.

Figure 2. The Government of Canada's GHG Emissions Reductions, 2001



Note: Due to rounding, the numbers may not add up and differ slightly among figures.

In 2001, about 81 percent (2420 kt) of the GHG emissions were associated with buildings; 16 percent, with the federal on- and off-road fleets (467 kt); and 3 percent (100 kt), with non-energy sources.

Overall, the Government of Canada's emissions reductions between 1998 and 2001 were achieved by reduced energy use and by switching to fuels that were less GHG intensive. As Figure 4 shows, 69 percent (136 kt) of the Government of Canada's total reduction came from reduced energy use and 31 percent (60 kt) came from switching to fuels that are less GHG intensive.

Further on, Chapter 6 highlights some of the programs and efforts employed by the Government of Canada to reduce energy use and, ultimately, GHGs. The remainder of this chapter, however, explores the Government of Canada's GHG emissions by examining emissions sources by sector.

Figure 3. GHG Emissions by Sector and Year

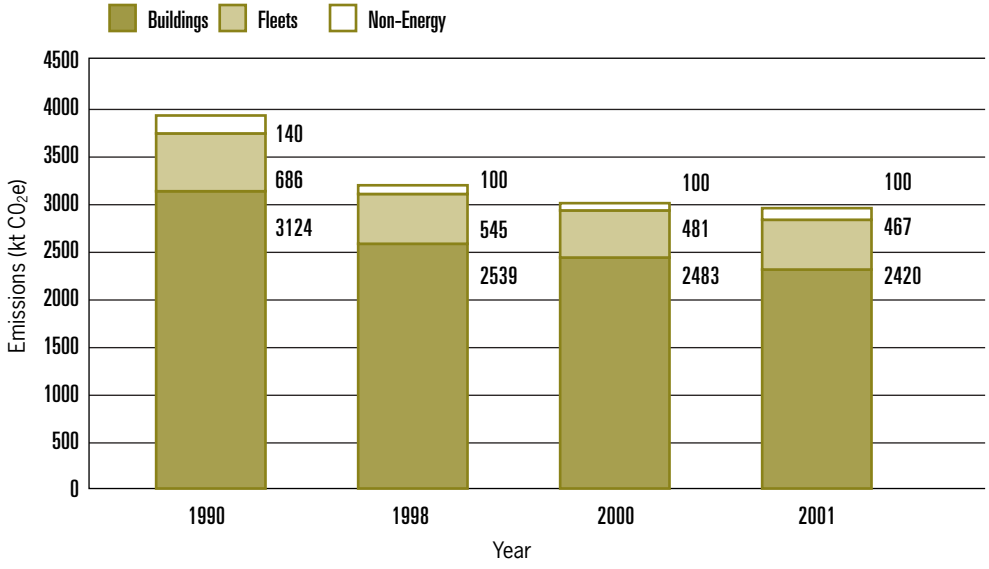


Figure 4. The Influence of Energy Use and GHG Intensity on the Change in the Government of Canada's Emissions

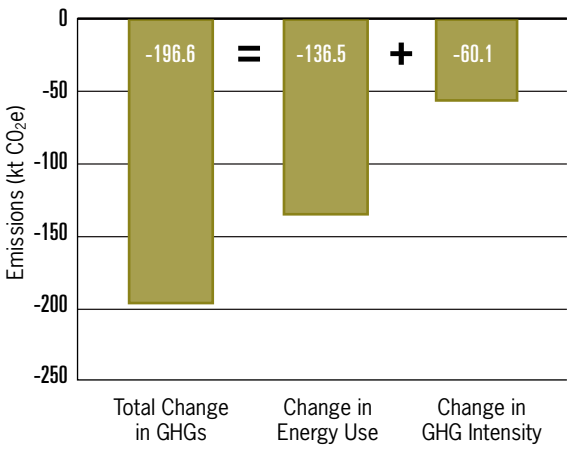


Figure 5. The Influence of Energy Use and GHG Intensity on the Change in Emissions From Federal Buildings

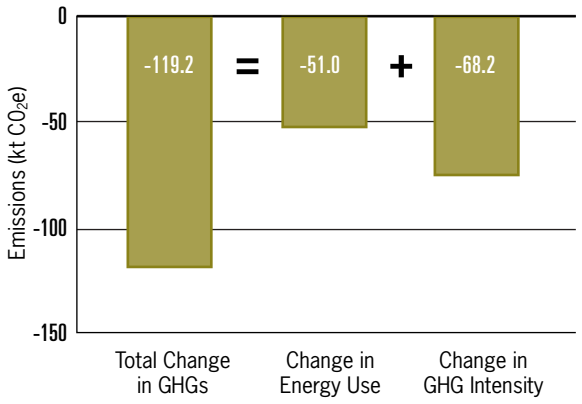
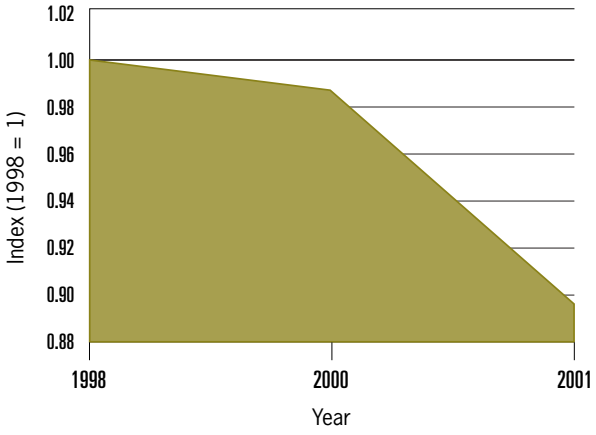


Figure 6. Trend in Energy Intensity for Federal Buildings, 1998–2001



5.2 Federal Buildings

In 2001, federal facilities emitted about 2420 kt of CO_2e. This represents a reduction of 63 kt of CO_2e since 2000. Between 1998 and 2001, the reductions total 119 kt of CO_2e. This reduction came from a switch to fuels that are less GHG intensive and from reduced energy use. Figure 5 shows how these two factors combine to give an overall reduction of 119 kt of CO_2e.

Energy intensity is a measure used to estimate the amount of energy used per square metre of floor space. Changes in this value over time can give insights into the energy-use performance of the buildings sector. A decline in energy intensity can be attributed to energy efficiency efforts. In addition, changes in weather and even building inventory can affect energy use and, ultimately, intensity. For example, buildings' housing laboratories typically use more energy than do buildings used for office space. A reduction in laboratory space and an equal increase in office space can result in a lower energy intensity value. Weather is another important factor that can influence energy intensity. An especially cold winter or hot summer can have a profound impact on energy use. Details on federal building stock and weather information will be incorporated into the analysis of future ERFO reports.

Nevertheless, energy intensity can still be calculated to gain some insight into the Government of Canada's total energy use. Overall, energy intensity has improved by 10 percent. That is, less energy per square metre was used in federal facilities in 2001. Figure 6 shows this trend between 1998 and 2001.

Figure 7 shows energy use in 2001 by fuel type. This is the first ERFO report to report energy from emerging renewable resources, or green power. As mentioned in Chapter 4, the Government of Canada intends to achieve a 235-kt reduction by 2010 through investment in emerging renewable resources. (This initiative is described further in Chapter 6.) For emissions from electricity, the FHIO initiative uses a national average emissions factor that assumes that natural gas is burned at the margin. Therefore, electricity from green sources, which have no associated GHG emissions, displaces the need to purchase electricity generated from the combustion of fossil fuels like natural gas. In 2001, the Government of Canada displaced about 11 kt of CO_2e by purchasing electricity from renewable energy sources.

Figure 8 shows GHG emissions from federal facilities by fuel type over time. Between 1998 and 2001, emissions from electricity declined by 117 kt of CO_2e, the majority of the Government of Canada's reductions from facilities. Reductions in emissions from oils used for heating outweighed the increase in natural gas, propane and other.[1] This represents the switch to fuels that are less GHG intensive, as Figure 5 shows (on page 12).

Figure 7. Buildings' Energy Use by Fuel Type, 2001

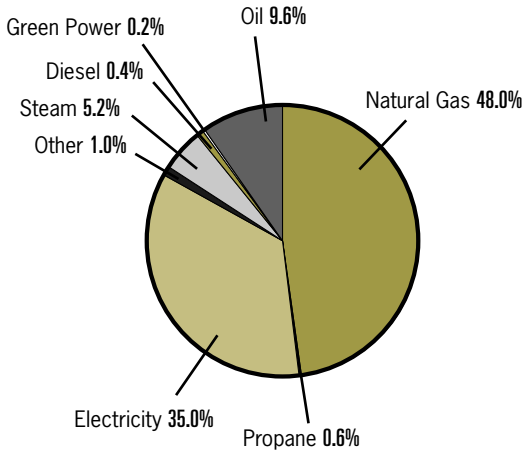
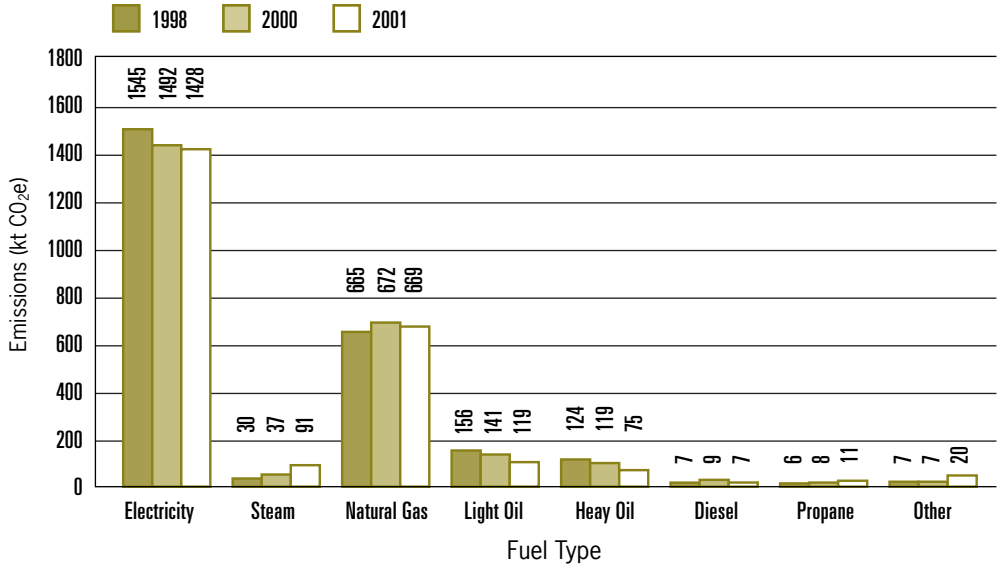


Figure 8. GHG Emissions by Fuel Type and Year for the Government of Canada's Buildings



[1] 'Other' is a category for non-traditional heating and power-generating fuels used in federal facilities. For example, the Department of National Defence uses aviation turbo-fuel to heat and power facilities located in the Canadian arctic!

5.3 Federal Fleet

The Government of Canada experienced an emissions reduction of 77 kt of CO_2e in its transportation sector between 1998 and 2001. As Figure 9 shows, 97 percent (75 kt) of the reduction came from reduced energy use; 3 percent (2 kt) resulted from a switch to fuels that have a lower GHG intensity.

The transportation sector has two sub-sectors: on road and off road. The off-road sector includes the federal air and marine fleets and field equipment. This includes off-road vehicles, such as all-terrain vehicles, portable generators and lawn mowers. Figure 10 shows the emissions for each sector by year.

Figure 9. The Influence of Energy Use and GHG Intensity on the Change in Emissions From the Federal On- and Off-Road Fleets

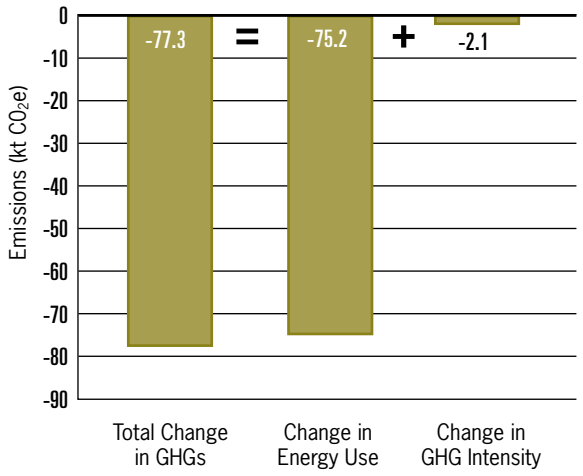
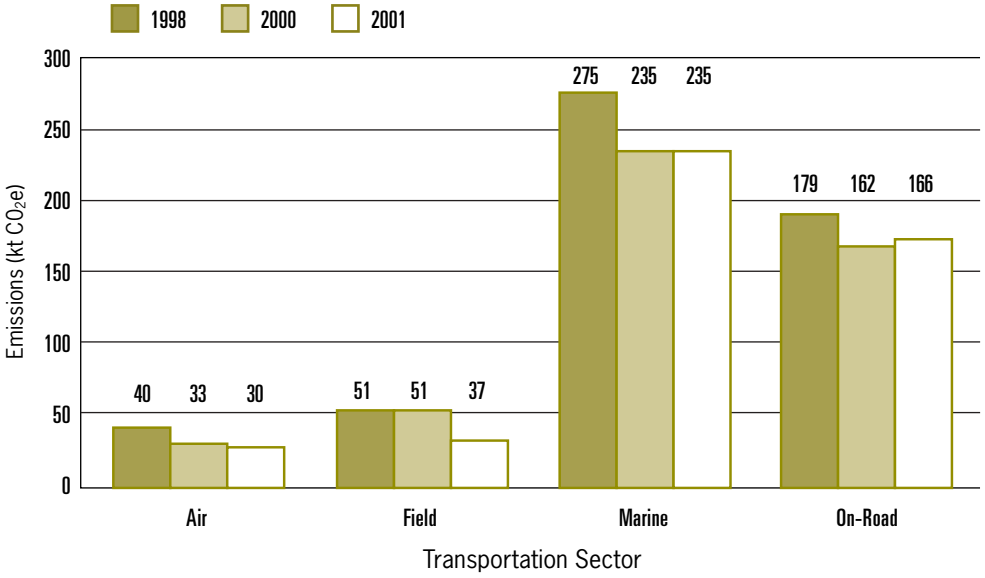


Figure 10. GHG Emissions by Sector and Year for Federal On- and Off-Road Fleets



ON-ROAD FLEET

Emissions for the Government of Canada's on-road fleet declined by about 14 kt of CO_2e between 1998 and 2001. Figure 11 shows that 98 percent (13.3 kt) of the emissions reduction came from a decrease in energy use, and about 2 percent (0.3 kt) came from switching to fuels that are less GHG intensive.

Figure 12 shows GHG emissions by fuel type for the on-road fleet. Emissions from the use of gasoline and diesel declined between 1998 and 2001. The level of emissions from propane and ethanol remained about the same during that period, whereas emissions from natural gas doubled. This is indicative of the federal fleet using more vehicles powered by alternative fuels, of which natural gas is the most popular.

Figure 11. The Influence of Energy Use and GHG Intensity on the Change in Emissions From the Federal On-Road Fleet

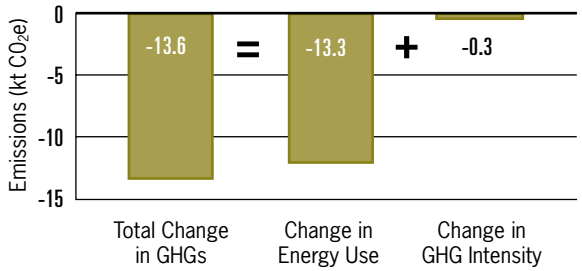
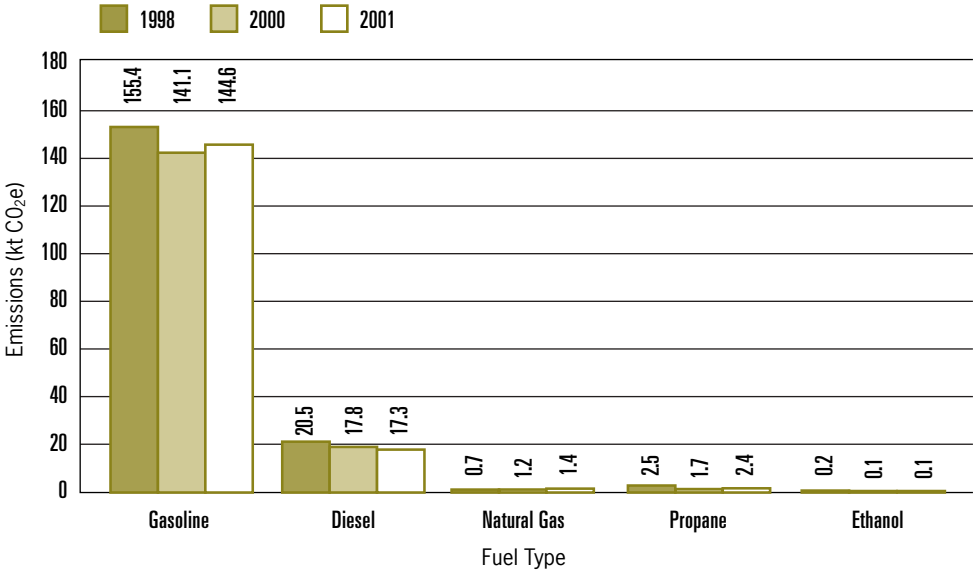
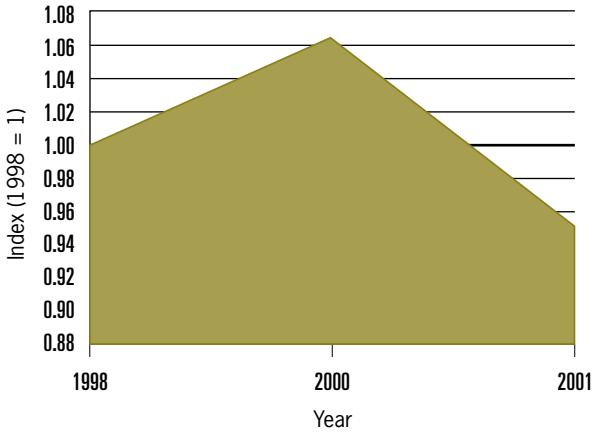


Figure 12. GHG Emissions by Fuel Type and Year for the Federal On-Road Fleet



Energy intensity for the federal on-road fleet has also improved since 1998. Like energy intensity for buildings, energy intensity for the on-road fleet is a ratio of energy use over activity. In this case, it is the amount of energy used per kilometre driven. Between 1998 and 2001, energy intensity has improved by about 4.5 percent, as Figure 13 shows. Even though kilometres driven decreased, an even greater decrease in energy use contributed to the overall decrease in energy intensity. Efforts such as matching the appropriate vehicle to the task and increasing the proportion of alternative fuel vehicles in the fleet have contributed to the overall improvement in GHG emissions. These efforts are described in Chapter 6.

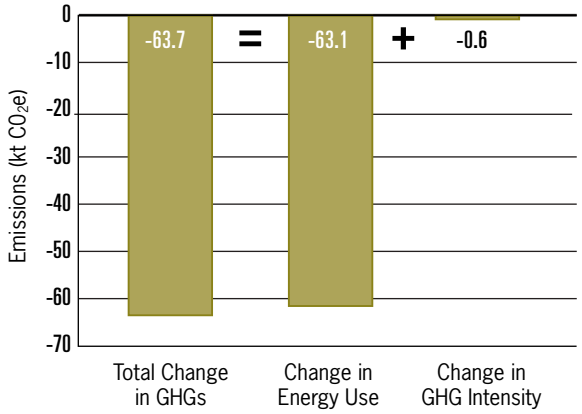
Figure 13. Trend in Energy Intensity for the Government of Canada's On-Road Fleet, 1998–2001



OFF-ROAD FLEET

The off-road sector, which includes the Government of Canada's air, marine and field fleets, saw an overall reduction of 64 kt of CO_2e. Most of the reduction occurred in the marine sector, with 40 kt. The field sector had a 14-kt reduction, and the air sector had a 10-kt reduction. All of these reductions can be attributed to reduced energy use, as Figure 14 shows. The off-road sector has less potential than the on-road sector to switch to fuels that are less GHG intensive. Therefore, reductions in GHG emissions come from reduced energy use, either through energy-efficient vehicles and equipment or simply through limited use of those items. Since 1998, this is what has been happening in the federal off-road fleet.

Figure 14. The Influence of Energy Use and GHG Intensity on the Change in Emissions From the Federal Off-Road Fleet



5.4 Non-Energy Sources

Non-energy GHG emissions were estimated for 1990 and 1998 based on an inventory of known sources from federal operations. These included federal landfill sites and agricultural operations. In 1990, estimated GHG emissions from non-energy sources were 140 kt, and this amount was estimated to have decreased to 100 kt by 1998. For 2001, the estimate is the same – 100 kt – as it was for 1998. Due to the difficulties in collecting reliable non-energy emissions data, all 11 departments and agencies reporting under the FHIO initiative have agreed to flat-line this figure until a suitable data-collection strategy for non-energy emissions has been established. Non-energy GHG emissions will therefore remain at 100 kt until the feasibility of collecting this data has been completed. Research is underway to identify a proper data-collection strategy and develop the right data-collection tools.

Federal GHG Emissions-Reduction Programs and Initiatives

Between 1990 and 2001, the Government of Canada reduced GHG emissions from its own operations by about 24 percent (963 kt of CO_2e). These reductions were realized with the assistance of programs and initiatives offered by such federal departments as Natural Resources Canada (NRCan), Public Works and Government Services Canada (PWGSC) and Environment Canada. The following outlines specific program contributions to the reduction of GHG emissions since 1990.

6.1 Current Program Highlights

Programs such as the Federal Buildings Initiative (FBI), the Federal Industrial Boiler Program and renewable energy programs helped reduce GHG emissions by supporting energy retrofits, providing energy managers with information about energy efficiency and GHG issues and encouraging the design of buildings that are more energy efficient.

The FBI model for energy efficiency improvements offers unique opportunities for everyone: It promotes healthy and productive workplaces for employees, increases investment in the growing energy service sector of the economy, helps reduce the cost of operations, generates thousands of jobs and lowers GHG emissions that contribute to climate change, acid rain and urban smog.

As the use of renewable energy is a key element of sustainable development, federal facilities are including renewable technology as a component of their overall energy efficiency strategy. Through the use of the FBI program, 4 Wing Cold Lake, Alberta, has constructed and successfully operates a solar wall, while Parks Canada's Banff National Park included solar hot water and photovoltaics in its energy efficiency improvements.

■ 6.1.1 FEDERAL BUILDINGS INITIATIVE

The FBI is a voluntary program developed and administered by NRCan's Office of Energy Efficiency (OEE) to help federal departments, agencies and Crown corporations cut their GHG emissions and energy and operating costs by improving the energy efficiency of their facilities. The FBI model is an approach that can help federal organizations achieve their GHG emissions targets under the FHIO initiative. The program's wide range of products and services – including its model documents, employee-awareness products, skills development services and environmental, health and safety guidelines – give them the confidence and flexibility they need to implement an energy management project without necessarily using their capital funds. Through the FBI's savings-financing option, a department can engage in a contractual agreement with a pre-qualified energy

Typical measures in comprehensive energy efficiency projects include lighting systems; heating, ventilating and air-conditioning (HVAC) systems; the building envelope; control systems; integrated systems; recommissioning; fuel conversions; cogeneration; water efficiency; renewable energy technology; training; and employee awareness programs.

management firm, allowing the department to pay for the project costs through the guaranteed savings generated by the energy efficiency improvements.

This program has helped foster more than 75 projects that involve 7000 buildings and facilities, has attracted $200 million in private sector investments, has saved $27 million a year and has reduced GHG emissions by 100 kt. The following are examples of FBI projects:

- Canadian Forces bases in all regions have awarded energy performance contracts to energy management firms. These contracts have resulted in the private sector investing more than $100 million in energy efficiency improvements and have saved $11 million a year.

Cogeneration, or the simultaneous production of heat and electricity, can extract 20 percent or more useful energy from a given amount of fossil fuel, compared with conventional systems. It can also increase savings while further reducing GHG emissions. For example, Federal Buildings Initiative projects have incorporated some 12 MW of installed capacity as part of energy efficiency improvements.

Canadian Forces bases at various stages of project implementation are as follows:

3 Wing Bagotville	CFB Esquimalt
4 Wing Cold Lake	CFB Gagetown
7 CFSD Edmonton	CFB Goose Bay
8 Wing Trenton	CFB Halifax
14 Wing Greenwood	CFB Montréal
17 Wing Winnipeg	CFB Petawawa
19 Wing Comox	CFB Shilo
CFB Borden	CFB Suffiled
CFB Edmonton	CFB Valcartier

The energy efficiency measures implemented under CFB Esquimalt's energy management services contract have been designed to reduce GHG emissions by more than 4500 tonnes per year. Energy efficiency measures will be carried out in more than 60 buildings on the base. Total annual savings are expected to reach $500,000.

- The Royal Canadian Mounted Police (RCMP) awarded an FBI energy management services contract at its Depot "T" Division and "F" Division headquarters in Regina, Saskatchewan. The project, estimated at $8 million, is expected to save $900,000 a year and reduce GHG emissions by 6 to 8 kt a year. The comprehensive energy efficiency measures will include installing an 800-kW reciprocating cogeneration unit, along with a solar-wall heat recovery system and an energy awareness program.
- The Parks Canada Agency awarded its first Federal Buildings Initiative (FBI) energy management services contract at Banff National Park, Alberta. Annual savings of $63,000 and GHG reductions of 157 tonnes per year are expected. A feasibility study has also been completed at Parks Canada's western and northern locations, incorporating energy efficiency measures in facilities from three provinces. Parks Canada's Terra Nova and Gros Morne national parks in Newfoundland and Labrador have also expressed interest in implementing an FBI project.

- Comprehensive energy-management training in the workplace contributes an additional 10 percent of savings in an energy improvement project. All FBI projects include a training component. The FBI and Seneca College of Applied Arts & Technology in Toronto, Ontario, have formed a partnership to deliver training as a key component of a successful project. The *Manager's Guide to Making Training Part of Your Energy Efficiency Project* provides a step-by-step process for making comprehensive management training part of the upgrade project. College accreditation can be acquired through a network of community colleges across Canada.
- Many energy performance contracts have been undertaken in federal facilities, including laboratories. Due to high equipment and ventilation loads, laboratories are more energy intensive than most other buildings. A pilot workshop was developed to further improve the energy efficiency of laboratory facilities through peer learning, energy management action and support. This included a series of workshops for facility managers to develop and share energy performance benchmarks, best practices, action plans and problem solving. Three federal and two provincial laboratory facilities participated.

6.1.2 FEDERAL VEHICLES INITIATIVE

NRCan developed the Federal Vehicles Initiative (FVI) in the 1990s to assist federal departments in increasing the energy efficiency of their motor vehicle fleets and to promote the *Alternative Fuels Act* within the federal fleet. The FVI's current role is to help departments reduce their GHG emissions from vehicle operations as part of the Federal House in Order program. Some of the approaches being promoted are reducing the fleet size and creating a mix of vehicles that are better suited for particular tasks (e.g. using a subcompact car instead of a van when only two passengers are in the vehicle). Other methods include introducing alternative vehicles and fuels, such as ethanol and natural gas and advanced-technology vehicles. The training of vehicle operators for safe and energy-efficient driving and for low-level maintenance that affects fuel efficiency and vehicle safety is also being developed.

Table 3 shows the number of vehicles acquired for the fleet of about 23 000 on-road vehicles in the largest federal departments, including the 11 targeted departments. The large number of vehicles acquired for the 2001–2002 fiscal year is consistent with departments implementing new security activities in response to the events of September 11, 2001. The number of alternative fuel vehicles was reduced compared with previous years; this is likely a response to departments realigning their vehicle acquisition budgets to acquire more less-expensive vehicles. The share of alternative fuel vehicles in the federal fleet remained at 3 percent in 2001.

Table 3. Acquisition of Alternative Fuel Vehicles in the Federal On-Road Fleet

Fiscal Year	Total On-Road Vehicles Acquired	Total Alternative Vehicles Acquired
1997–1998	2250	131 (5.8%)
1998–1999	2409	161 (6.7%)
1999–2000	2522	181 (7.2%)
2000–2001	3282	226 (6.9%)
2001–2002	3984	126 (3.1%)

Examples of the FVI's activities include the following:

- The FVI has promoted E-85 (fuel type) within the federal vehicle fleet. At the end of 2001–2002, a commercial E-85 fuelling site was opened in Ottawa, Ontario. There are plans to open new fuelling sites at Agriculture and Agri-Food Canada locations in several provinces. The number of active vehicles using E-85 increased to 142 from last year's 57, and E-85 use nearly doubled over the previous year, to 85 000 L.
- The FVI has started to develop a driver training course for energy efficiency through the Canada Safety Council's Defensive Driving Course. Several departments require that drivers successfully complete this course for access to departmental vehicles.

- The federal fleet acquired 40 Toyota Prius gasoline-electric hybrid vehicles in 2001–2002, increasing the number of hybrid vehicles to 95. The FVI has promoted these energy-efficient vehicles and highlighted the Government of Canada's leadership at trade auto shows for the public.
- The FVI helped organize the first workshop for federal fleet managers by sponsoring sessions on vehicle safety, the acquisition of alternative fuel vehicles and the on-road testing of natural gas and electric vehicles.

6.1.3 EMERGING RENEWABLE ELECTRICITY

In 1997, NRCan and Environment Canada made a commitment to purchase 15 to 20 percent of their electrical energy in the form of green power by 2010. Under their first pilot project, ENMAX Energy Corporation, an Alberta electric utility company, provides NRCan with 10 000 megawatt hours (MWh) and Environment Canada with 2200 MWh of electricity every year for 10 years to operate their facilities in Alberta. During 2000–2001, ENMAX Energy reported reductions of 10.9 kt of GHG emissions due to the displacement of electricity generated by a mix of coal and natural gas.

In 2000, NRCan signed a $12.4-million, 10-year agreement with SaskPower for the annual delivery of about 32 000 MWh of wind power from the SunBridge Wind Power Project in southwestern Saskatchewan. The SunBridge facility was developed in partnership by Enbridge Inc. and Suncor Energy Inc. In February 2002, SaskPower began delivering the wind power to Government of Canada facilities in Saskatchewan. During the last two months of 2001–2002, the Government of Canada received 5400 MWh of electricity and reduced its GHG emissions by 5 kt.

Early in 2001, with additional funding from the Government of Canada purchases' initiative under the *Government of Canada Action Plan 2000 on Climate Change*, NRCan signed a $4.6-million, 10-year agreement with Maritime Electric Company, Limited for 13 000 MWh of wind power a year. The electricity is being generated at a facility built and operated by the province at North Cape, Prince Edward Island. The wind farm began delivering electricity to Government of Canada facilities in Prince Edward Island in September 2000. During the last half of 2001–2002, 6600 MWh of wind power were delivered, and GHG emissions were reduced by 5.6 kt. For each of the pilots, ownership of the emissions reductions is transferred to the Government of Canada.

In response to a proposal made by the Electricity Table under Canada's climate change consultations, the *Government of Canada Action Plan 2000 on Climate Change* announced that the Government of Canada has committed to purchase 20 percent of federal electricity requirements from emerging renewable electricity by 2010. This measure is expected to yield two main benefits. First, it will help suppliers of these emerging sources to become more experienced and cost-competitive. Second, the Government of Canada expects to avoid producing at least 240 kt of GHG emissions by 2010.

During 2001–2002, memoranda of understanding were signed with Nova Scotia Power and NB Power to negotiate purchases of emerging renewable electricity by the Government of Canada. In addition, work was undertaken on a draft request for proposals for 90 000 MWh annually of power in Ontario.

6.1.4 RENEWABLE ENERGY DEPLOYMENT INITIATIVE

NRCan's Renewable Energy Deployment Initiative (REDI) was launched as a three-year initiative in April 1998 and was extended for an additional three years to March 2004 under Budget 2000. REDI promotes the market for heating and cooling systems in commercial buildings, including federal facilities, that use energy from the sun, the earth and biomass sources. These systems include the following: solar air heating; solar water heating; clean biomass heating; and ground-source heat pump (earth energy) systems.

REDI focuses on increasing market awareness for renewable energy, stimulating renewable energy installations through project facilitation and the provision of a direct financial incentive and building the capacity for renewable energy industries. REDI for Federal Facilities encourages federal organizations to include renewable energy systems in their building decisions and provides funding support for solar and biomass systems that meet REDI's qualifications. Under the *Government of Canada Action Plan 2000 on Climate Change*, REDI was expanded to include on-site electricity generation from solar photovoltaics, wind and micro-hydro at federal facilities. This initiative, called On-Site Generation at Federal Facilities, aims to encourage installations in high-visibility federal buildings in grid-connected locations and to develop a sustainable market for cost-effective renewable energy applications in off-grid federal facilities.

Examples of renewable energy considerations within the federal sector are as follows:

- In 1997, the first air-heating system was installed on an exterior wall of a laboratory building at NRCan's Bells Corners CANMET complex in Ottawa, Ontario. This has led to a reduction of 44 tonnes of CO_2 per year.
- In 1998, NRCan's CANMET Energy Technology Centre (CETC) in Varennes, Quebec, installed a 220-square-metre (m^2) SOLARWALL® that can supply 340 m^2 (12 000 cubic feet) of warmed air per minute, or about 400 gigajoules of renewable energy to the building per year, resulting in a reduction of 30 tonnes (t) of CO_2 per year.
- Also in 1998, the Canadian Coast Guard installed a solar air-heating system in a maintenance building in Prescott, Ontario, that has reduced GHG emissions by 11 t per year.
- Guidelines for FBI projects now specify that the feasibility of including renewable energy systems should be evaluated by energy management services companies (EMSCs) when proposing energy performance contracts for federal facilities.
- CETC – Varennes has developed and delivers training on the use of the RETScreen® International tool, which enables decision-makers to assess renewable energy project investments before they are made. The centre also provides post-training technical support for EMSCs, employees and contractors on energy efficiency and renewable energy projects in federal facilities.
- REDI has assisted the Canada Customs and Revenue Agency and the RCMP to advance earth energy system projects in their facilities via support for developing communications strategies and management tools to facilitate renewable energy project decisions.

6.1.5 AWARENESS, EDUCATION AND TRAINING

Several federal initiatives are aimed at increasing awareness and encouraging actions by federal employees and industry to address climate change and reduce GHG emissions. Following are examples:

- Several federal departments, including the Department of National Defence, Environment Canada, NRCan, PWGSC and Statistics Canada, have held events that celebrate and promote the benefits of energy efficiency. A number of departments have offered climate change workshops to employees, to raise awareness of the issue and to encourage them to take action. The FHIO initiative also ran a pilot project to develop employee awareness.
- In October 2000, NRCan's OEE hosted Canada's Energy Efficiency Conference and Trade Show in Ottawa. More than 500 delegates from academic, industrial, government and non-governmental organizations attended this two-day event. It provided a forum for experts to share knowledge and inspire innovation in energy efficiency as a means of helping Canada achieve its climate change commitments.
- NRCan's OEE has also delivered energy management workshops to more than 2000 industrial, institutional, commercial and governmental clients over four years to help them develop action plans to reduce energy consumption in their organizations. These workshops complement the comprehensive energy management training that facility managers and operators undergo as part of energy efficiency retrofit projects.
- The Government of Canada has established a climate change Web site (www.climatechange.gc.ca). It has links to other key government and non-governmental sites that provide information on policy and scientific, technical and program resources related to climate change.

6.2 The Leadership Challenge

The Leadership Challenge, led by Environment Canada, is a component of the FHIO initiative. It is designed to demonstrate leadership by issuing a challenge to all federal departments, agencies and Crown corporations to design and implement a GHG emissions-reduction program and to report annually on progress. The Leadership Challenge is now assisting federal entities in establishing baseline data and developing GHG emissions-reduction programs. Environment Canada will be formally signing these organizations onto the Leadership Challenge during the 2003–2004 fiscal year.

One example of a Leadership Challenge initiative during the past year is the launch of the FHIO initiative Web site (www.fhio.gc.ca), which contains extensive information to assist federal entities in tracking and reducing GHG emissions. The Leadership Challenge has also worked with federal entities on data collection and analysis, has helped launch GHG reduction initiatives (e.g. anti-idling) and has actively communicated the FHIO initiative's programs to employees. As part of the Government of Canada's broader commitment to sustainable development and to greening government operations, the Leadership Challenge will also promote and support continuous improvement over the FHIO initiative's 10-year commitment period. Moreover, it will ensure that GHG emissions reduction is integrated into the environmental management systems of federal entities.

The Leadership Challenge is also working with Transport Canada to undertake projects and promote best practices in "outside emissions." The FHIO initiative has defined outside emissions as GHG and other air emissions that are not directly attributable to Government of Canada operations but are a result of government and work-related activities, such as employee commuting, business travel and the movement of goods. The first outside emissions project under the FHIO initiative is the National Capital Region (NCR) transit pass pilot that was launched on November 1, 2002, in Environment Canada, NRCan, Transport Canada and the Treasury Board of Canada Secretariat. This program offers employees in the four departments access to a discounted annual transit pass through monthly payroll deductions. As of June 2003, over 900 employees have signed up for the transit pass pilot. It is now being evaluated to assess the feasibility of rolling it out to all departments in the NCR and nationally.

Other tools have also been developed to assist departments implement outside emissions projects, including a Web-based commuter options survey and a site assessment protocol on commuter options. Environment Canada, Quebec Region, developed the Travel Alternatively Program to encourage employees to use alternative modes of transportation (e.g. biking, busing, walking, carpooling) when commuting to and from work and to track GHG emissions from employee travel and taxi use in order to reduce GHG emissions. The Government of Canada has also participated in four carbon-neutral conferencing initiatives, leading to a total reduction of 4612.5 t of CO_2e. In these projects, carbon credits were purchased from international projects (e.g. energy-efficient social housing in South Africa) to offset the GHG emissions associated with hosting a conference and/or the travel associated with Canadian delegations attending a conference. These carbon credits are in the process of being retired.

Conclusion

The Government of Canada is committed to reducing GHG emissions from its operations and reaching the federal target in 2010. Future FHIO annual reports will continue to monitor and report progress toward reaching the target. They will also continue to improve the scope of emissions and the quality of information contained in them. This report and related information can be found on the FHIO Web site at www.fhio.gc.ca.

Appendix A. Energy Use and Emissions Data for Buildings

Buildings – Fuels by Type, 2001–2002

Fuel Type	Energy Units (MJ)	CO_2 (t of CO_2e)	CH_4 (t of CO_2e)	N_2O (t of CO_2e)	CO_2e (kt)
Electricity					
Conventional	*9 562 515 449*	–	–	–	*1 439*
Green Power (Departmental)	*4 320 000*	*0*	*0*	*0*	*0*
Steam	1 412 368 817	–	–	–	91
Cogeneration	0	0	0	0	0
Natural Gas	13 097 208 048	665 238	273	3 817	669
Light Oil	1 621 675 261	118 649	5	403	119
Heavy Oil	1 003 886 633	74 335	61	477	75
Diesel	98 044 254	6 920	7	314	7
Propane	176 894 452	10 393	3	232	11
Other	266 530 357	18 916	12	574	20
Green Power Initiative	46 080 000	0	0	0	(11)
Total	**27 289 523 270**	**894 452**	**362**	**5 817**	**2 420**
Floor Space (m^2)					**20 277 476**

Buildings – Fuels by Type, 1998–2001

	1998		2000		2001	
Fuel Type	**Energy Units (MJ)**	**CO_2e (kt)**	**Energy Units (MJ)**	**CO_2e (kt)**	**Energy Units (MJ)**	**CO_2e(kt)**
Electricity						
Conventional	*10 266 935 248*	*1 545*	*9 912 663 414*	*1 492*	*9 562 515 449*	*1 439*
Green Power (Departmental)	*0*	*0*	*0*	*0*	*4 320 000*	*0*
Steam	472 038 573	30	571 269 880	37	1 412 368 817	91
Cogeneration	0	0	0	0	0	0
Natural Gas	13 011 090 525	665	13 144 296 957	672	13 097 208 048	669
Light Oil	2 119 054 106	156	1 923 688 024	141	1 621 675 261	119
Heavy Oil	1 659 646 709	124	1 588 930 217	119	1 003 886 633	75
Diesel	88 975 316	7	116 146 834	9	98 044 254	7
Propane	102 823 352	6	132 317 037	8	176 894 452	11
Other	89 106 400	7	89 106 400	7	266 530 357	20
Green Power Initiative	0	0	0	0	46 080 000	(11)
Total	**27 809 670 230**	**2 539**	**27 478 418 764**	**2 483**	**27 289 523 270**	**2 420**
Floor Space (m^2)		**18 539 728**		**18 494 191**		**20 277 476**

Appendix B. Energy Use and Emissions Data for Transportation

Transportation – Fuels by Type, 2001–2002

Fuel Type	Energy Units (MJ)	CO_2 (t of CO_2e)	CH_4 (t of CO_2e)	N_2O (t of CO_2e)	CO_2e (kt)
On-Road Total	**2 333 776 632**	**158 521**	**280**	**44**	**165.6**
Diesel	*239 745 096*	*16 921*	*0*	*1*	*17.3*
Gasoline	*2 029 988 203*	*138 222*	*13*	*20*	*144.6*
Propane	*37 840 538*	*2 223*	*1*	*0*	*2.3*
*CNG**	*21 393 989*	*1 086*	*265*	*11*	*1.4*
Ethanol 85	*4 647 637*	*59*	*1*	*12*	*0.1*
Ethanol 10	*161 169*	*10*	*0*	*0*	*0.0*
Air Total	**411 659 078**	**29 206**	**27**	**818**	**30.1**
Turbo-Fuel	*405 808 223*	*28 801*	*19*	*805*	*29.6*
Aviation Gas	*5 850 855*	*405*	*8*	*12*	*0.4*
Marine Total	**2 996 551 607**	**211 319**	**14**	**76**	**235.1**
Diesel	*2 926 229 378*	*206 531*	*11*	*76*	*230.2*
Gasoline	*70 322 229*	*4 788*	*3*	*0*	*4.9*
Light Oil	*0*	*0*	*0*	*0*	*0.0*
Field Total	**482 059 105**	**33 535**	**14**	**9**	**36.7**
Diesel	*316 861 663*	*22 364*	*1*	*9*	*25.2*
Gasoline	*156 903 702*	*10 684*	*12*	*0*	*11.0*
Propane	*8 293 740*	*487*	*0*	*0*	*0.5*
Total	**6 224 046 422**	**432 581**	**335**	**946**	**467.4**

*Compressed Natural Gas

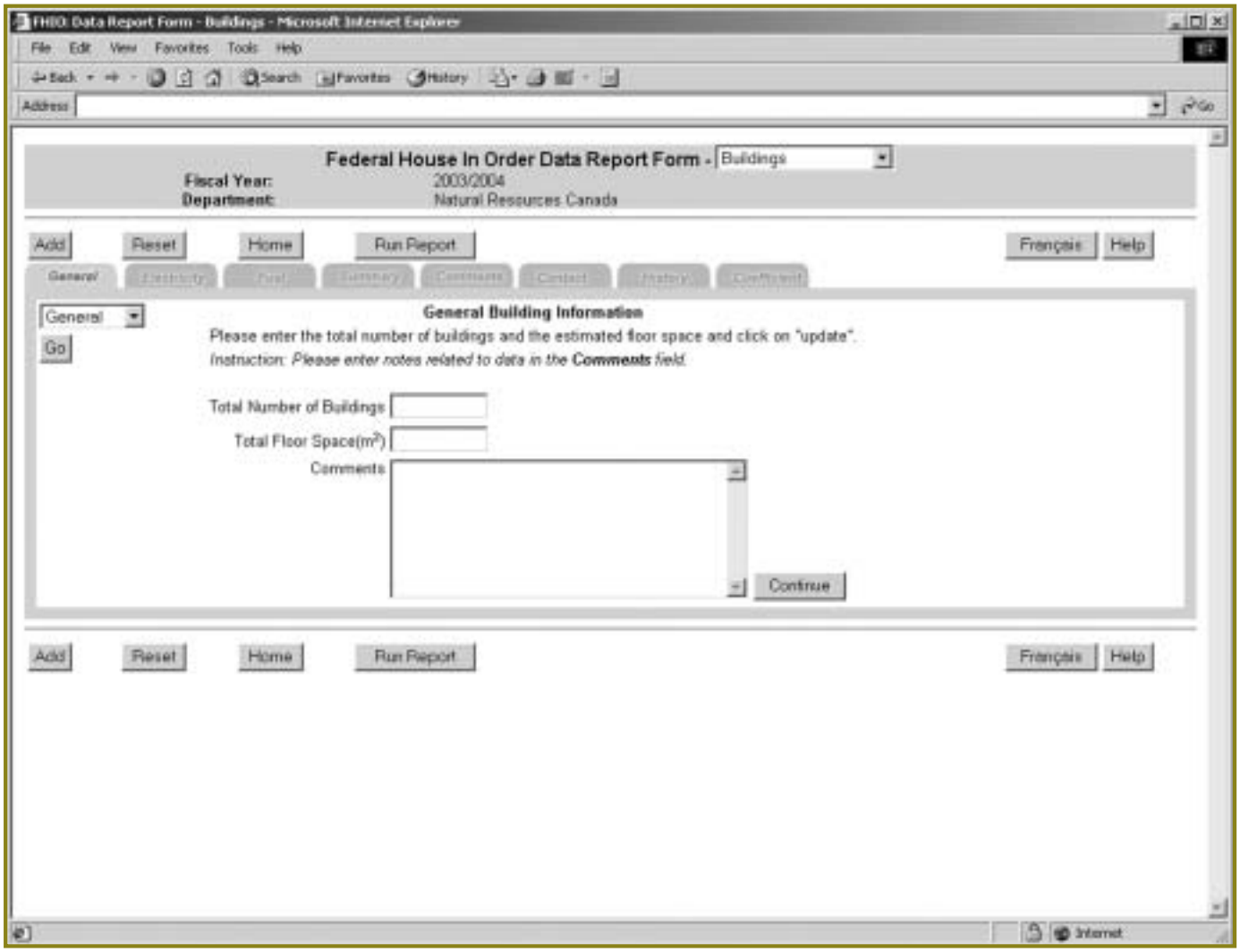
Transportation – Fuels by Type, 1998–2001

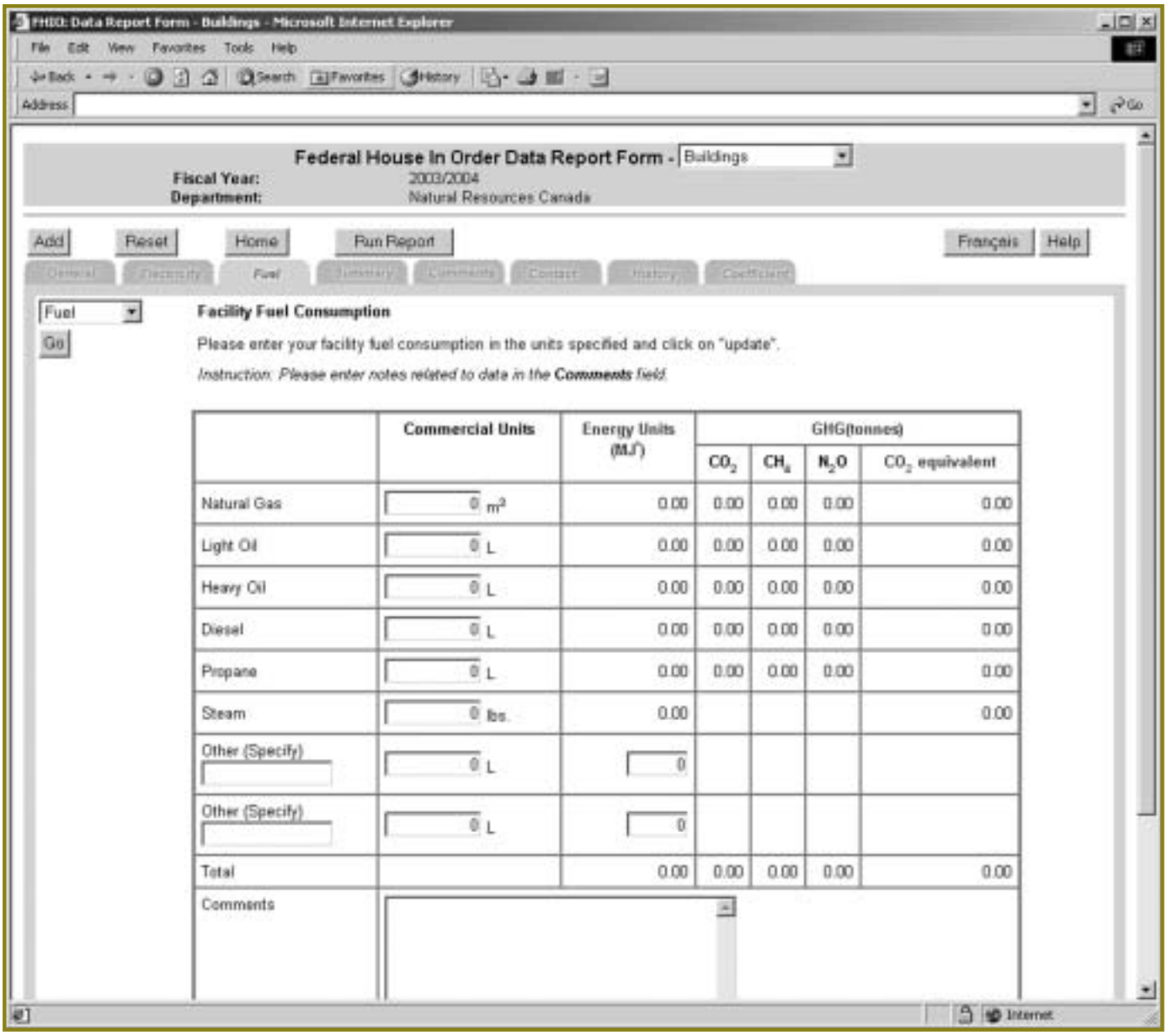
	1998		2000		2001	
Fuel Type	**Energy Units (MJ)**	**CO_2e (kt)**	**Energy Units (MJ)**	**CO_2e (kt)**	**Energy Units (MJ)**	**CO_2e(kt)**
On-Road Total	**2 520 665 783**	**179.2**	**2 280 354 482**	**161.9**	**2 333 776 632**	**165.6**
Diesel	*284 055 592*	*20.5*	*246 601 447*	*17.8*	*239 745 096*	*17.3*
Gasoline	*2 181 562 407*	*155.4*	*1 980 486 385*	*141.1*	*2 029 988 203*	*144.6*
Propane	*41 263 935*	*2.5*	*28 251 472*	*1.7*	*37 840 538*	*2.3*
*CNG**	*10 423 181*	*0.7*	*18 927 418*	*1.2*	*21 393 989*	*1.4*
Ethanol 85	*397 341*	*0.0*	*5 682 272*	*0.1*	*4 647 637*	*0.1*
Ethanol 10	*2 963 326*	*0.2*	*405 487*	*0.0*	*161 169*	*0.0*
Air Total	**554 633 297**	**40.5**	**458 363 304**	**33.5**	**411 659 078**	**30.1**
Turbo-Fuel	*547 303 330*	*40.0*	*452 508 851*	*33.0*	*405 808 223*	*29.6*
Aviation Gas	*7 329 967*	*0.5*	*5 854 452*	*0.4*	*5 850 855*	*0.4*
Marine Total	**3 489 846 166**	**274.6**	**2 988 302 883**	**235.0**	**2 996 551 607**	**235.1**
Diesel	*3 488 827 889*	*274.5*	*2 981 982 250*	*234.6*	*2 926 229 378*	*230.2*
Gasoline	*1 018 276*	*0.1*	*6 320 632*	*0.4*	*70 322 229*	*4.9*
Light Oil	*0*	*0.0*	*0*	*0.0*	*0*	*0.0*
Field Total	**658 427 204**	**50.5**	**667 787 772**	**50.9**	**482 059 105**	**36.7**
Diesel	*474 185 198*	*37.7*	*448 695 779*	*35.7*	*316 861 663*	*25.2*
Gasoline	*173 849 049*	*12.2*	*207 720 551*	*14.6*	*156 903 702*	*11.0*
Propane	*10 392 957*	*0.6*	*11 371 442*	*0.7*	*8 293 740*	*0.5*
Total	**7 223 572 449**	**544.8**	**6 394 808 441**	**481.3**	**6 224 046 422**	**467.4**

*Compressed Natural Gas

Appendix C. Data Collection Tools

On-Line Forms




FHIO: Data Report Form - Buildings - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address
Go
Federal House In Order Data Report Form - Buildings
Fiscal Year: 2003/2004
Department: Natural Resources Canada
Add Reset Home Run Report Français Help
General Electricity Fuel Summary Comments Contact History Coefficient
Fuel
Go
Facility Fuel Consumption
Please enter your facility fuel consumption in the units specified and click on "update".
Instruction: Please enter notes related to data in the Comments field.
Commercial Units
Energy Units (MJ)
GHG(tonnes)
CO2
CH4
N2O
CO2 equivalent
Natural Gas 0 m3 0.00 0.00 0.00 0.00 0.00
Light Oil 0 L 0.00 0.00 0.00 0.00 0.00
Heavy Oil 0 L 0.00 0.00 0.00 0.00 0.00
Diesel 0 L 0.00 0.00 0.00 0.00 0.00
Propane 0 L 0.00 0.00 0.00 0.00 0.00
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Internet

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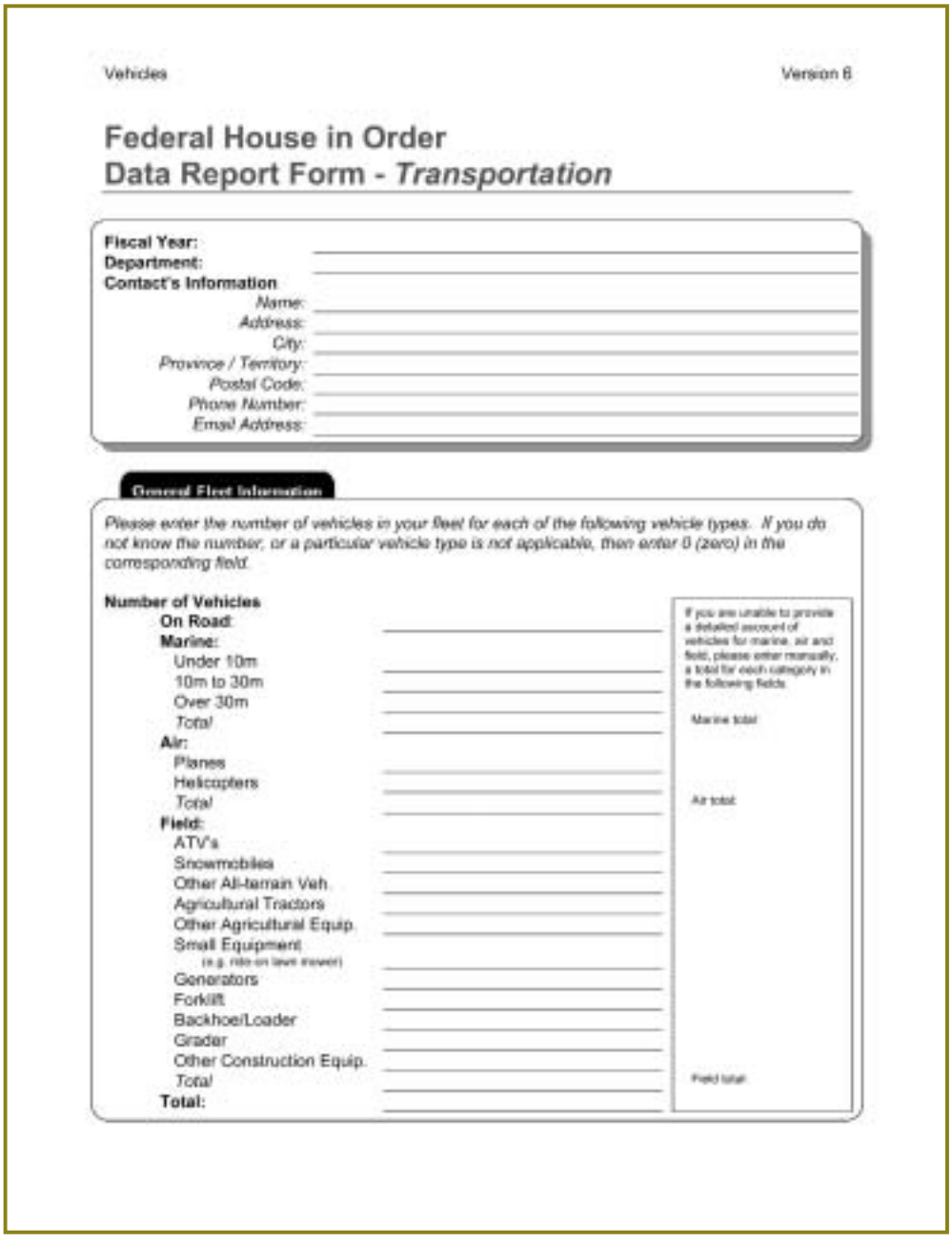

Vehicles Version 6

Federal House in Order
Data Report Form - *Transportation*

Fiscal Year: _____
Department: _____
Contact's Information
Name: _____
Address: _____
City: _____
Province / Territory: _____
Postal Code: _____
Phone Number: _____
Email Address: _____

General Fleet Information

Please enter the number of vehicles in your fleet for each of the following vehicle types. If you do not know the number, or a particular vehicle type is not applicable, then enter 0 (zero) in the corresponding field.

Number of Vehicles

On Road:	
Marine:	
Under 10m	
10m to 30m	
Over 30m	
Total	
Air:	
Planes	
Helicopters	
Total	
Field:	
ATV's	
Snowmobiles	
Other All-terrain Veh.	
Agricultural Tractors	
Other Agricultural Equip.	
Small Equipment (e.g. ride-on lawn mower)	
Generators	
Forklift	
Backhoe/Loader	
Grader	
Other Construction Equip.	
Total	
Total:	

If you are unable to provide a detailed account of vehicles for marine, air and field, please enter manually, a total for each category in the following fields

Marine total

Air total

Field total

Vehicles Version 6

Fuel Consumption

For each of the following fleet categories, please enter the amount of fuel consumed. Be sure to enter the amount of fuel consumed in the units specified for each particular fuel type.

On Road Fuel Consumption

	Commercial Units	Energy Units (MJ)	GHG (tonnes)			
			CO_2	CH_4	N_2O	CO_2 equiv.
Gasoline	L					
Diesel	L					
CNG*	L					
Propane	L					
Ethanol 10	L					
Ethanol 85	L					
Subtotal						

* Compressed Natural Gas

Marine Fuel Consumption

	Commercial Units	Energy Units (MJ)	GHG (tonnes)			
			CO_2	CH_4	N_2O	CO_2 equiv.
Gasoline	L					
Diesel	L					
Light Fuel Oil	L					
Subtotal						

Aircraft Fuel Consumption

	Commercial Units	Energy Units (MJ)	GHG (tonnes)			
			CO_2	CH_4	N_2O	CO_2 equiv.
Aviation Turbo Fuel	L					
Aviation Gasoline	L					
Subtotal						

Field Vehicle and Equipment Fuel Consumption

	Commercial Units	Energy Units (MJ)	GHG (tonnes)			
			CO_2	CH_4	N_2O	CO_2 equiv.
Gasoline	L					
Diesel	L					
Propane	L					
Subtotal						

Vehicles Version 6

Summary Information

Total Energy (GJ) _____

Total GHG Emissions (kilotonnes of CO_2 equiv.) _____

Comments and Suggestions

Buildings

Version 6

Federal House in Order
Data Report Form - *Buildings*

Fiscal Year: _____
Department: _____

Contact's Information

Name: _____
Address: _____
City: _____
Province / Territory: _____
Postal Code: _____
Phone Number: _____
Email Address: _____

General Building Information

Please enter the total number of buildings in your department, and the estimated floor space.

Total Number of Buildings _____
Total Floor Space (m^2) _____

Electricity Consumption

In kilowatt-hours, please enter your total electricity usage over the fiscal year.

Amount Used in Natural Units (kWh) _____
Amount Used in Energy Units (MJ) _____
GHG emissions (CO_2 equivalent in tonnes) _____

Facility Fuel Consumption

For the following table, please enter your department's facility fuel consumption over the fiscal year. Be sure to enter the amount of fuel consumed in the units specified for each particular fuel type.

	Commercial Units	Energy Units (MJ)	GHG (tonnes)			
			CO_2	CH_4	N_2O	CO_2 equiv.
Natural Gas	m^3					
Light Oil	L					
Heavy Oil	L					
Diesel	L					
Propane	L					
Steam*	lbs					
Subtotal						

*Please, only record information for steam that was purchased

Summary Information

Total Energy (GJ)	
Total GHG Emissions (kilotonnes of CO_2 equiv.)	

Comments and Suggestions

Appendix D. GHG Conversion Factors

Converting From Natural Units to Energy Units (MJ)

Fuel	Conversion Factor
Aviation Gasoline (L)	33.62
Aviation Turbo-Fuel (L)	35.93
Diesel (L)	38.68
Electricity (kWh)	3.6
Ethanol 10 (L)	34.66
Ethanol 85 (L)	41.72
Heavy Oil – No. 6 (L)	41.73
Light Oil – No. 2 (L)	38.68
Motor Gasoline (L)	34.66
Natural Gas (m^3)	37.23
Natural Gas (L)	0.03723
Propane (L)	25.53
Steam (lb.)	1.266

Converting From Energy Units to CO_2 Equivalent

Fuel	CO_2 Equivalent (t/TJ)
Electricity	150.5
Steam	64.23

Converting From Natural Units to Component Greenhouse Gases

Fuel	GHG (g/L or m^3)		
	CO_2	CH_4	N_2O
Global Warming Potential	**1**	**21**	**310**
Aviation Gasoline			
Air	2330	2.19	0.23
Aviation Turbo-Fuel			
Air	2550	0.08	0.25
Diesel			
Stationary	2730	0.133	0.4
On Road	2730	0.0605	0.2
Marine	2730	0.15	1.0
Field	2730	0.14	1.1
Ethanol 10			
On Road	2124	0.2273	0.3358
Ethanol 85			
On Road	531	0.2273	0.3358
Natural Gas			
Stationary (m^3)	1891	0.037	0.035
On Road (L)	1.89	0.022	0.00006
Motor Gasoline			
On Road	2360	0.2273	0.3358
Marine	2360	1.300	0.06
Field	2360	2.7	0.05
Light Oil – No. 2			
Stationary	2830	0.006	0.031
Marine	2830	0.300	0.07
Heavy Oil – No. 6			
Stationary	3090	0.1200	0.064
Marine	3090	0.3000	0.08
Propane			
Stationary	1500	0.024	0.108
On-Road and Field	1500	0.52	0.028