

**B.C. Government Operations  
Greenhouse Gas Progress Report  
2001-2004**

**Submitted to  
CSA Climate Change GHG Registries**

Province of British Columbia

May 2006

---

## B.C. Government Operations Greenhouse Gas Progress Report 2001-2004

### STATEMENT OF ENDORSEMENT

May 31, 2006

Brian Rawson, Registry Analyst  
GHG Registries  
CSA Climate Change  
Canadian Standards Association  
600-170 Laurier Ave W.  
Ottawa, Ontario K1P 5V5



Dear Mr. Flemington:

I am pleased to submit the British Columbia Government Operations Greenhouse Gas Progress Report 2001-2004 to CSA Climate Change, GHG Registries. This progress report sets out commitments and actions to reduce greenhouse gas emissions from our own operations.

In February 2004, the Crown agency responsible for government buildings, the BC Buildings Corporation, submitted its own Action Plan for Energy Efficiency and Greenhouse Gas Reduction. Then, in December of that year the government released *Weather, Climate and the Future: B.C.'s Plan* including measures to reduce emissions in government buildings, transportation, and purchasing.

These documents outlined commitments to reduce the energy intensity of buildings and develop targets for cleaner transportation in ministries and agencies. During 2001-2004, significant progress was made toward those commitments, notably through the launch of a comprehensive building audit and retrofit program and strategies to acquire cleaner vehicles and fuels.

The B.C. Government remains firmly committed to greenhouse gas emission reduction and to developing and implementing the actions required to meet its commitments. Taking action on climate change benefits British Columbia's environment, economy, and future generations.

Sincerely,

A handwritten signature in black ink, appearing to read "Barry Penner". The signature is stylized with large, flowing loops.

Honourable Barry Penner  
Minister of Environment

## CONTENTS

Acronyms	iii
Executive Summary	iv
Introduction	1
B.C. Government Profile	2
Education, Training, and Awareness	2
Government Restructuring	5
Commitment	6
Emissions from Buildings	7
Emissions from Transportation	12
Total Emissions	16
Monitoring, Reporting, and Performance Measurement	17
References	18
Appendix A: Emission Factors	19

**ACRONYMS**

AFV	Alternative Fuel Vehicle
ATV	All Terrain Vehicle
BAU	Business as Usual
BCBC	British Columbia Buildings Corporation
BEPI	Building Energy Performance Index
CNG	Compressed Natural Gas
CO <sub>2</sub> e	Carbon Dioxide Equivalent
CRD	Capital Regional District
CSA	Canadian Standards Association
EAS	Energy Accounting System
EMP	Energy Management Program
GHG	Greenhouse Gas
GJ	Gigajoule
LEED	Leadership in Energy and Environmental Design
MJ	Megajoule
PEO	Public Education and Outreach
TDM	Transportation Demand Management
VCR	Voluntary Challenge and Registry
VKT	Vehicle Kilometres Travelled
WSI	Workspace Solutions Inc.

---

## EXECUTIVE SUMMARY

This report documents the British Columbia Government's progress in reducing greenhouse gas (GHG) emissions from its operations over the 2001-2004 period. In total, GHG emissions from buildings and transportation were reduced by 23.9% (32,700 tonnes) of carbon dioxide equivalent (CO<sub>2</sub>e) between 2000 and 2004. This occurred through a combination of government restructuring, improvements in building energy intensity, and fuel switching in vehicle fleets.

The emission reduction satisfies an initial commitment made to the Voluntary Challenge and Registry program (VCR Inc.), now the Canadian GHG Challenge Registry. In November 2000, the government committed to reduce its GHG emissions by 16% by 2005. Since then, it has moved to establish more refined targets that are better suited to the major sources of government emissions.

In particular, the BC Buildings Corporation (BCBC)<sup>1</sup> established a target to reduce the energy intensity of monitored buildings by 12% between 2000 and 2007. By the end of 2004, energy intensity was down 9.6% and total buildings emissions were lower by 27,700 tonnes CO<sub>2</sub>e (31.3%) as a result of a reduction in occupied floor space, energy efficiency improvements, and a decline in the electricity emission factor.

In vehicle transportation for government business (excluding employee commuting), GHG emissions were reduced by 5,000 tonnes CO<sub>2</sub>e (10.4%) through 2004, due to fleet downsizing and fuel switching from gasoline to propane and compressed natural gas. Emission savings from fuel switching were partially offset by the increased use during that period of diesel fuel in provincial ambulances and forest firefighting trucks.

Going forward, the government has committed to develop ministry- and agency-specific targets for cleaner vehicles, fuels, and transportation services. These targets will recognize progress made during the 2000-2004 period and will reflect the potential to further reduce GHG emissions through greater use of hybrid vehicles and biodiesel and ethanol blend fuels. They will be rolled into an aggregate commitment for government transportation that will be used together with the buildings target to measure future progress on total emission reduction.

This report details the GHG reductions in buildings and transportation, discusses educational and outreach initiatives related to climate change, and outlines procedures for monitoring, reporting, and performance measurement.

---

<sup>1</sup> On April 1, 2006, BCBC became the Accommodation and Real Estate Services division of Shared Services BC within the Ministry of Labour and Citizens' Services. For the purposes of this report covering 2001 through 2004, the former name has been retained.

---

## INTRODUCTION

In November 2000, the B.C. Government submitted its first Action Plan on Climate Change to Canada's Voluntary Challenge and Registry (VCR) Inc.<sup>2</sup> The Action Plan presented an inventory of greenhouse gas emissions from government buildings and vehicles (for the 1990 baseline and 1999), established an initial target for emission reduction, and identified a series of actions to achieve the target. The target was to reduce GHG emissions from government operations by 16% between 2000 and 2005.

In October 2001, the government's first Progress Report on Climate Change was submitted to VCR Inc.<sup>3</sup> The progress report documented GHG emissions for the year 2000 and described ongoing measures from renewable energy projects to hybrid vehicles for pursuing the emission reduction target.

Since the first progress report, a number of important initiatives have been completed with implications for the government's planned emission reductions. BCBC made its initial VCR submission in February 2004.<sup>4</sup> The *Action Plan for Energy Efficiency and Greenhouse Gas Reduction* set a new target for BCBC monitored buildings to reduce their energy intensity by 12% between 2000 and 2007. It provided an inventory of GHG emissions from buildings and corporate transportation for the years 1990 and 2000-2002, and outlined a program of energy retrofits and other measures to realize the energy intensity reduction target.

Also during 2004, the government finalized a comprehensive climate change plan containing 40 actions to reduce GHG emissions across British Columbia.<sup>5</sup> A key component of *Weather, Climate and The Future: B.C.'s Plan* (climate change plan) is government leadership, with consistent actions to cut emissions in provincial buildings, transportation fleets and services, and general purchasing.

In June 2005, BCBC submitted a progress report on its Action Plan to the Canadian GHG Challenge Registry. The report documented emission results for 2003 and 2004 and progress towards meeting the 2007 target.<sup>6</sup>

All of the above documents have helped inform preparation of the *B.C. Government Operations Greenhouse Gas Progress Report 2001-2004*. This report describes progress on reducing emissions in government buildings and transportation, restates the commitments to energy and emission reduction, and updates ongoing and planned measures to achieve the targets.

---

<sup>2</sup> Province of B.C. (2000), *British Columbia VCR Action Plan 2000*.

<sup>3</sup> Province of B.C. (2001), *British Columbia VCR Progress Report*.

<sup>4</sup> BCBC (2004), *An Action Plan for Energy Efficiency and Greenhouse Gas Reduction*.

<sup>5</sup> Province of B.C. (2004), *Weather, Climate and The Future*.

<sup>6</sup> BCBC (2005), *2003-2004 Progress Report on Energy Efficiency and Greenhouse Gas Reduction*.

## B.C. GOVERNMENT PROFILE

The provincial government is one of British Columbia's largest enterprises in operational terms. It employs more than 31,200 public servants across the province, with the heaviest concentrations of employees in the Capital Regional District (CRD) on Southern Vancouver Island and the Greater Vancouver Regional District.<sup>7</sup>

BCBC provides accommodation services to public sector agencies. Its diverse portfolio includes office buildings, courthouses, forestry complexes, ambulance stations, and correctional centres. In 2004, the Corporation owned and leased buildings covering approximately 1.7 million square metres of floor space.

At the end of December 2004, the provincial fleet<sup>8</sup> consisted of about 2,700 leased light vehicles encompassing cars, vans, sport utility vehicles, and pickup trucks. The government also owned and operated more than 500 ambulances, about 200 heavy trucks and pieces of equipment, and a lesser number of small vehicles such as motorbikes, ATVs, and snowmobiles. In addition, some vehicles were rented on a seasonal basis.

In 2004, GHG emissions from government buildings and vehicles were estimated at 104,000 tonnes CO<sub>2</sub>e.<sup>9</sup>

## EDUCATION, TRAINING, AND AWARENESS

### *Staff and Workplace Education and Training*

The B.C. Government provides information and support to its employees and agencies on GHG reduction-related activities such as higher performance (green) buildings, green fleet options, and transportation demand management.

#### Building Operator and Staff Training

BCBC has offered a variety of training on energy efficiency, environmental design, and other aspects of higher performance buildings. This has included local workshops and technical resources for building operators under the Energy Management Program (EMP) as well as staff courses in energy efficient technologies.

In 2003 and 2004, BCBC strengthened staff expertise in green building principles, practices and technologies. Over 100 staff were trained on the LEED<sup>®</sup> (Leadership in Energy and Environmental Design) building rating system, with 34 receiving LEED professional accreditation by September 2004.

#### Green Buildings BC

Since March 2000, the Green Buildings BC initiative has been working to reduce the environmental impact and improve the performance of schools, hospitals, and other provincially funded facilities. Its Retrofit Program offers workshops, a how-to guide, access to low-cost financing, and other support for educational and health care institutions to retrofit their buildings

<sup>7</sup> BC Public Service Agency (2005), *2004/05 Annual Service Plan Report*.

<sup>8</sup> The numbers reported here exclude the vehicle fleets of Crown corporations.

<sup>9</sup> See Table 9 on p. 16.

for energy and water efficiency. The New Buildings Program provides tools and resources to guide the high performance design and construction of new facilities. Green Buildings BC is funded by the government, BCBC, and BC Hydro.

Over the 2001-2004 period, more than 1,000 workshops, meetings, and other outreach activities were delivered to assist retrofit clients. An integrated design process was tested in four building pilot projects, with energy savings ranging from 26% to 54% better than the Model National Energy Code for Buildings standard.

#### Higher Performance Building Policy

In addition to setting an energy performance target, the new provincial building policy under development is expected to establish a system of building performance targets for new construction of provincially funded facilities. These targets would be based on a recognized building rating system, such as LEED or Green Globes/Go Green. While the policy will apply to facilities delivering provincial services, the intent will also be to improve design practices and building performance in local government and commercial buildings throughout the province.

#### Environmentally Responsible Purchasing

Across government, capital asset managers are encouraged to consider environmentally responsible products and services, including hybrid vehicles, as part of their purchasing decisions. In November 2004, the Procurement Governance Office issued *Guidelines for Procurement of Environmentally Responsible Products and Services*.<sup>10</sup> Government has most recently drafted an environmentally responsible procurement strategy for the Province, with energy efficiency and GHG emission reduction considered important elements of the strategy.

#### Biodiesel Development

In 2003, work began on a feasibility study to explore the development of a commercially viable biodiesel industry in British Columbia. The B.C. Government contributed to this study, which led to the December 2004 launch of a six-month biodiesel field test in eight Capital Region vehicle fleets. Two BC Mail Plus delivery trucks took part in this field test.

Work also started on Fleet Challenge BC's province-wide biodiesel market development project (BC Biofleet), which was subsequently launched in March 2005. Results to date include the largest fleet purchase of biodiesel in the country and Western Canada's first card lock biodiesel pump for the trucking industry (in Burnaby). BC Ambulance Service has signed on as a participant in BC Biofleet.

#### Transportation Demand Management (TDM)

Since 1997, Greater Victoria's annual Bike to Work Week campaign has worked to raise the profile of cycling and expand commuter use of the bicycle. It has experienced exponential growth every year, with more than 5,100 riders and 820 new participants in 2004. The B.C. Government was a major source of funding in 2004 and is now supporting an expansion to other communities in the province.

The government co-sponsored four TDM employer forums held in the CRD in September 2004. The purpose was to gain an understanding of how familiar major employers are with TDM, how

---

<sup>10</sup> See <http://www.pc.gov.bc.ca>.



much they support it, and what steps they might take to implement such activities in their workplaces.

### ***Public Education and Outreach (PEO)***

The government also undertakes public education and outreach to encourage GHG reduction activities by businesses, communities, other institutions, and individual British Columbians.

#### Government Climate Change Website

The Ministry of Environment maintains a climate change website focused on impacts on British Columbia and actions that government is taking to reduce GHG emissions and increase the capacity to adapt.<sup>11</sup> The website posts related government publications, including a March 2002 report showing how temperature, precipitation, and some associated physical and biological systems have changed in the province during the last hundred years.<sup>12</sup> It also includes links to proceedings from workshops on regional climate change impacts.

Another recent addition to the climate change website is the Greenhouse Gas Action Guide.<sup>13</sup> The Guide, produced with federal and local agencies and other partners, is a compilation of straightforward, cost-effective GHG reduction initiatives. It is meant to help local governments carry out immediate actions to reduce their emissions.

#### Fleet Challenge BC and Accreditation for Green Vehicles

Since the spring of 2004, the B.C. Government has been involved in Fleet Challenge Canada (formerly the National Fleet Challenge), through its regional partner Fleet Challenge BC. A first project was to provide support and substantial hybrid fleet data to Fleet Challenge BC's Hybrid Experience Report.<sup>14</sup>

The government began consultation on Fleet Challenge BC's Green Fleet Accreditation System in the fall of 2004. This resulted in the initiative moving to CSA for implementation as a national program, with specific recognition to the Province and the City of Vancouver as project initiators and sponsors.

#### BC Climate Exchange

The B.C. Government is funding the BC Climate Exchange in partnership with the federal One Tonne Challenge, the Fraser Basin Council, and the Canadian Institute for Climate Studies. Created in January 2002, the Exchange is part of a national network of climate change PEO "Hubs". It connects the B.C. organizations involved in education and outreach on climate change and related issues such as energy efficiency, green buildings, transportation, and sustainable industry. The BC Climate Exchange website includes information and resources for teachers, businesses, industry, communities, First Nations groups, and the general public.<sup>15</sup>

---

<sup>11</sup> See <http://wlapwww.gov.bc.ca/air/climate/index.html#10>.

<sup>12</sup> Ministry of Water, Land and Air Protection (2002), *Indicators of Climate Change for British Columbia*.

<sup>13</sup> See <http://wlapwww.gov.bc.ca/air/climate/index.html#ghgguide>.

<sup>14</sup> See <http://www.hybridexperience.ca>.

<sup>15</sup> See <http://www.bccclimateexchange.ca/index.php>.

### Clean Air Day

Each year, as part of Canadian Environment Week, the provincial and federal governments promote Clean Air Day with their many partners, in particular local communities. The objective over the months of May and June is to encourage public awareness and action around local air quality, energy, and climate change issues. In 2004, 13 communities across the province actively participated under the theme “Clean Air: Yours, Mine, Ours,” pursuing the connections between energy and the air B.C. residents breathe.

### Way to Go! School Program

The Insurance Corporation of BC and Autoplan Brokers operate the provincial Way to Go! school program.<sup>16</sup> Their RoadSense Team provides support to elementary and middle schools to learn about making safe choices on B.C. roads as a positive step toward ensuring that the school journey is safer, healthier, and more environmentally responsible. To date, more than one-third of the province’s elementary and middle schools have requested the Way to Go! resource kit.

### Climate Change Shows

The provincial government co-sponsored an exhibit of the Climate Change Show at Vancouver's Science World. Schools from throughout the Lower Mainland and thousands of families were exposed to this multi-media event.

## **GOVERNMENT RESTRUCTURING**

In 2001/02, the B.C. Government launched a process to review and rationalize the core services delivered by provincial ministries and Crown agencies. Under a three-year restructuring plan, two initiatives in particular have had significant implications for its GHG emissions:

- Government Accommodation Reduction Initiative – Between 2001/02 and 2003/04, the B.C. public service was reduced in size by more than 7,600 employees,<sup>17</sup> reducing occupied building floor space and lowering energy consumption and associated GHG emissions. Through the end of 2004/05, owned and leased floor space had fallen by 16% relative to 2000/01.
- Alternative Approaches to Service Delivery – The government has been taking steps to deliver its services more efficiently, including sharing common administrative and systems support services across ministries, while increasing the role of the private sector in service delivery.

The emission reductions reported in this document reflect the combined impact of government restructuring and measures taken to reduce energy consumption, fuel use, and GHG emissions. Where possible, the effect of restructuring, which acts to transfer emissions to parties outside the government, is presented separately.

---

<sup>16</sup> See <http://www.waytogo.icbc.bc.ca>.

<sup>17</sup> Province of B.C. (2004), *Budget and Fiscal Plan 2004/05 – 2006/07*.

---

## COMMITMENT

### ***B.C. Climate Change Plan***

In *Weather, Climate and The Future: B.C.'s Plan*, the government indicated an intent to show leadership in reducing GHG emissions and in incorporating climate change adaptation into its own planning and operations. The Plan lists 40 province-wide actions under five categories – sustainable energy production and efficient use, efficient infrastructure (transportation, buildings and communities), sustainable forest and carbon sink management, government leadership and outreach, and water management. Government leadership includes the following actions:

- Action 25: BCBC is conducting energy audits and retrofits of provincial buildings under a renewed energy management initiative.
- Action 26: A new Higher Performance Building Policy will be applied to all new provincially funded buildings.
- Action 27: The government will develop guidelines and performance targets for ministries and Crown agencies to acquire cleaner vehicles, fuels, and transportation services. (Under this action, the government will also update guidelines to encourage provincial agencies to purchase office products and services that have less climatic impact.)
- Action 28: The government will encourage ministries and Crown corporations to incorporate emission reducing policies and guidelines in their service plans.
- Action 29: The government will address climate change and extreme weather in planning and operations.

These actions continue the government's commitment to emission reduction in its own operations, as well as its role in promoting GHG management in other provincially funded institutions, such as hospitals and schools.

### ***Developing and Implementing the GHG Action Plan***

#### **Buildings**

The energy intensity target and emission reduction measures specified below for buildings were developed by a BCBC team established in March 2002. The Energy Aspect Team was one of 13 such teams responsible for planning the implementation of the Corporation's environmental management system<sup>18</sup>. It was tasked with developing a baseline for energy consumption, setting the original objectives and targets, and designing programs and measures to reach the targets. An EMP Team within BCBC's Technical Value Department now has responsibility for creating and managing a program plan that will realize the targets and measures. Under a contract requirement, the new outsource provider of BCBC's property management services (Workspace Solutions Inc., or WSI) has implemented an environmental management system, including

---

<sup>18</sup> In April 2004, BCBC outsourced its property management function and most of the aspect teams were disbanded. BCBC now provides strategic objectives and targets to the outsource provider, which is responsible for further planning and implementation. However, BCBC's Energy Management Program Team continues to oversee all building energy audits and retrofits and to review strategic targets.

energy use as an environmental aspect. WSI is working with the EMP Team on targets for individual buildings consistent with BCBC's own 12% energy intensity reduction target by 2007.

### **Transportation**

Under the new provincial climate change plan, the government will develop a set of guidelines and appoint a lead agency to work with ministries and Crown corporations to set individualized performance targets for cleaner transportation. Each ministry and Crown agency will remain responsible for developing and implementing measures to achieve its target. The Ministry of Transportation already took the lead in this regard in 1999 by adopting a mandate to shift its vehicle fleet to alternative fuel vehicles (AFVs).

### ***Reviewing the GHG Action Plan***

Each year, BCBC's EMP Team reviews the energy intensity target, analyzing energy efficiency initiatives taken to date, progress in achieving energy and emission reductions, and measures available for further reductions. It is also expected that ministries and Crown corporations will review and report annually on progress towards meeting their transportation performance targets.

## **EMISSIONS FROM BUILDINGS**

### ***Energy Intensity Target***

BCBC's Action Plan for Energy Efficiency and Greenhouse Gas Reduction established the year 2000 as the baseline for measuring progress on reducing energy consumption and GHG emissions in government buildings. It also set a December 2007 target of 1,112 Megajoules per square metre (MJ/m<sup>2</sup>) for the Building Energy Performance Index (BEPI) of buildings actively monitored with the Corporation's Energy Accounting System (EAS). These "Group A" EAS buildings represent about half of the owned and leased floor space in the BCBC portfolio.

The 2007 target amounts to a 12% reduction in the energy intensity of Group A buildings and an estimated 3,800 tonnes/year CO<sub>2</sub>e reduction in GHG emissions for the entire buildings portfolio.

### ***Energy Efficiency Measures***

The energy intensity target will be met through BCBC's Energy Management Program, which implemented three phases of activity over the reporting period:

- The first phase, launched in late 2001, provided a checklist of building energy efficiency opportunities and other information as groundwork for the program.
- In the second phase started in November 2001, BCBC staff and building operators undertook a desktop opportunity assessment of all Group A buildings to rank them for energy efficiency potential.
- The third phase begun in March 2002 involves detailed energy audits and retrofits on those facilities offering the greatest efficiency potential.

As of December 31, 2003, energy audits had been conducted in 25 buildings, and retrofits completed in three facilities – saving approximately 7,800 Gigajoules (GJ) of electricity per year,

or about 50 tCO<sub>2</sub>e of GHG emissions annually.<sup>19</sup> Thirteen additional retrofits were completed in 2004, adding about 31,200 GJ of annual electricity savings (240 tCO<sub>2</sub>e per year in emission savings) and 6,300 GJ of natural gas savings (310 tCO<sub>2</sub>e per year). Projects since completed or scheduled through the end of 2006 will bring the total number of buildings to be audited and/or retrofitted to around 60.

In addition to the audits and retrofits, a number of supporting initiatives will contribute to meeting the government's energy intensity target and reducing GHG emissions, including:

- *Power Smart incentives* – BC Hydro's Power Smart program is providing incentives to help fund the audits and retrofits, with \$984,000 received for projects completed in 2003 and 2004.
- *NRCan incentives* – BCBC successfully applied for a \$250,000 incentive from Natural Resources Canada's Office of Energy Efficiency (Retrofit Assistance Program), to be used for retrofit projects completed during calendar years 2004 through 2006.
- *Computer power savings* – As the first initiative in a power management strategy for government computers, approximately 12,000 computers were programmed to shut off their monitors after 20 minutes. Further computer power management savings are being achieved with new technology that is scheduled for procurement through 2006.
- *Green power* – The government arranged to purchase electricity generated from methane at the Hartland Landfill near Victoria, which helped meet the Ministry of Environment's 2004 energy requirements.
- *Higher Performance Building Policy* – This new policy will set an energy performance target for all new construction and major renovations of buildings used to deliver provincial services, including education and health care as well as ministry and Crown services.

These initiatives are described further in the BCBC Action Plan and its 2003-2004 Progress Report.

### ***Estimation of Emissions***

The estimation of GHG emissions from buildings is based on data taken from BCBC's Energy Accounting System, which records energy consumption by energy type, floor space, and energy intensity (BEPI) for each Group A building. To estimate actual GHG emissions for 2000 through 2002, annual Gigajoule (GJ) consumption by energy type in these buildings was first grossed up to the entire BCBC portfolio by multiplying through by the ratio of total floor space to Group A floor space.<sup>20</sup> Then, for each greenhouse gas (carbon dioxide, methane, and nitrous oxide), this total consumption by energy type was multiplied by the appropriate emission factor. Finally, total emissions from buildings were calculated as the sum across all energy types and gases.

---

<sup>19</sup> The estimates of GHG savings in this paragraph are based on the 2003 and 2004 emission factors for electricity, as described below.

<sup>20</sup> Historical experience has shown that non-EAS buildings have tended to mirror EAS buildings in terms of energy efficiency improvements due to better building operation and maintenance.

The same gross-up procedure was not applied to 2003 and 2004, as 2003 was the first year in which the retrofits of Group A buildings had a noticeable impact on energy consumption. For these years, it could not be assumed that other BCBC buildings would track the energy consumption of those in Group A. As a result, total consumption for buildings other than Group A was estimated by multiplying the 2002 BEPI (prior to the retrofit impact) by the 2003 or 2004 non-Group A floor space. This value was then allocated by energy type and added to the Group A consumption values, and GHG emissions were calculated as above.

For the 2007 target year, two emission projections were made in order to estimate the GHG reductions from the energy efficiency measures. The “Business As Usual (BAU) Projection” estimates energy consumption and GHG emissions assuming that BCBC had not implemented its Action Plan. In this scenario, building emissions are lower in 2007 simply because of the effect of government restructuring (i.e., the 24% decline in floor space relative to 2000). The “Target Projection” estimates energy use and emissions based on carrying out the Action Plan to achieve the 12% energy intensity reduction. Under this scenario, emissions are lower in 2007 because of the combined impact of restructuring and improved energy efficiency. The difference between the two projections gives the reduction in GHG emissions directly attributable to the retrofits and other measures in the Action Plan.

With the exception of electricity, GHG emission factors for the various energy types are taken from information provided by CSA Climate Change, GHG Registries.<sup>21</sup> Electricity emission factors are derived from BC Hydro’s *Greenhouse Gas Report*, which reports both historical and forecast values.<sup>22</sup> These emission factors vary from year to year depending on annual water flows, which affect the proportions of power generation from hydroelectric and thermal facilities.

More detailed explanations of the methodology and assumptions for estimating buildings emissions are provided in the BCBC Action Plan and its 2003-2004 Progress Report.<sup>23</sup>

### **Overview of Results**

The estimates of energy consumption and GHG emissions in government buildings are summarized in Table 1. Results are shown for the 2000-2004 historical period and the 2007 target year.

For Group A buildings, energy intensity declined by 9.6% between 2000 and 2004, total energy consumption fell by 16.9%, and GHG emissions declined by 26.4%. For all government buildings, energy use was estimated to be down 22.5%, and emissions down 31.3% over the same period. The 27,700 tCO<sub>2</sub>e reduction in GHG emissions overall reflects the improvement in energy intensity, a 16% decline in floor space under government restructuring, and a 40% decline in the electricity emission factor. The 2004 electricity emission factor was down by a substantial amount over the base year because 2000 was a relatively low water year for the

---

<sup>21</sup> CSA Climate Change, GHG Registries (2005), *Canadian GHG Challenge Registry Guide to Entity & Facility-Based Reporting*, Table 3. See Appendix A of this report.

<sup>22</sup> BC Hydro (2003), *2003 Greenhouse Gas Report*, and BC Hydro (2005), *2004 Greenhouse Gas Report*. See more on the electricity emission factors in the Appendix to this report.

<sup>23</sup> In particular see BCBC (2004), Appendix A.

**Table 1: Buildings Energy Consumption and GHG Emissions**

	2000	2001	2002	2003	2004	2007B <sup>1</sup>	2007T <sup>2</sup>
<b>Group A Buildings Only<sup>3</sup></b>							
Energy Intensity/BEPI (GJ/m <sup>3</sup> )	1.258	1.214	1.182	1.158	1.137	1.258	1.112
Change over 2000		-3.5%	-6.1%	-8.0%	-9.6%	0.0%	-11.7%
Floor area (m <sup>3</sup> )	974,000	979,700	965,300	908,200	895,300	761,800	761,800
Energy Use (GJ)	1,225,700	1,189,100	1,140,900	1,052,000	1,018,000	958,600	846,800
GHG Emissions (tCO <sub>2</sub> e)	42,800	42,900	35,200	31,600	31,500	33,200	30,300
<b>All Buildings</b>							
Floor area (m <sup>3</sup> )	2,012,200	2,011,600	1,968,400	1,811,700	1,694,100	1,519,600	1,519,600
Gross-up factor <sup>4</sup>	2.066	2.053	2.039	N/A	N/A	N/A	N/A
Energy Use (GJ)	2,532,000	2,441,600	2,326,400	2,119,700	1,962,100	1,912,200	1,742,500
GHG Emissions (tCO <sub>2</sub> e)	88,500	88,000	71,800	63,700	60,800	66,200	62,400

<sup>1</sup> Business-as-Usual Emission Projection (without energy audits and retrofits).

<sup>2</sup> Target Emission Projection (with energy audits and retrofits).

<sup>3</sup> Includes only those buildings actively monitored by BCBC's Energy Accounting System.

<sup>4</sup> This is the factor used to gross up energy consumption in Group A buildings to estimate energy use for the total BCBC portfolio.

hydroelectric power system, requiring greater reliance on thermal generation sources and hence higher emissions.

In 2007, buildings emissions are projected to be about 26,100 tonnes CO<sub>2</sub>e lower than they were in the 2000 base year. The measures in the Action Plan are expected to account for 3,800 tonnes of this total reduction, with the remaining 22,300 tonnes attributable to government restructuring (i.e., the floor space reduction).

Tables 2 and 3 show the results by energy type for energy consumption and GHG emissions, respectively. Natural gas and electricity account for the largest shares of both total energy use and total emissions. The variation in electricity emissions from year to year is largely due to changes in the previously mentioned emission factor. Thus, for example, total electricity consumption fell by 5% between 2001 and 2002, but electricity emissions fell by 62% (with a 60% reduction in the BC Hydro emission factor).

**Table 2: Buildings Energy Consumption by Fuel Type (GJ)**

<b>Fuel</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2007B</b>	<b>2007T</b>
Natural Gas	1,249,000	1,213,800	1,190,700	1,085,200	1,012,300	976,400	938,100
Heating Oil #2	93,700	39,400	7,400	5,400	13,100	8,700	9,000
Steam	29,200	34,600	28,600	30,200	21,500	26,700	27,500
Propane	46,300	39,200	36,400	13,800	12,500	20,700	21,400
Electricity	1,113,800	1,114,700	1,063,300	985,200	902,700	879,700	746,400
Total	2,532,000	2,441,600	2,326,400	2,119,700	1,962,100	1,912,200	1,742,500
Change over 2000		-3.6%	-8.1%	-16.3%	-22.5%	-24.5%	-31.2%

**Table 3: Buildings GHG Emissions by Fuel Type (tonnes CO<sub>2</sub>e)**

<b>Fuel</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2007B</b>	<b>2007T</b>
Natural Gas	62,400	60,600	59,400	54,200	50,500	48,700	46,800
Heating Oil #2	6,900	2,900	500	400	1,000	600	700
Steam	2,200	2,700	2,200	2,300	1,600	2,100	2,100
Propane	2,800	2,400	2,200	800	800	1,200	1,300
Electricity	14,200	19,500	7,400	6,000	6,900	13,500	11,500
Total	88,500	88,000	71,800	63,700	60,800	66,200	62,400
Change over 2000		-0.6%	-18.9	-28.0%	-31.3%	-25.2%	-29.5%

**Table 4: Buildings Emissions by Greenhouse Gas (tonnes CO<sub>2</sub>e)**

<b>Gas</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2007B</b>	<b>2007T</b>
Carbon Dioxide	88,000	87,600	71,400	63,400	60,500	65,900	62,100
Methane	30	30	30	20	20	20	20
Nitrous Oxide	400	400	400	300	300	300	300
Total	88,500	88,000	71,800	63,700	60,800	66,200	62,400



The breakdown of buildings emissions by greenhouse gas is shown in Table 4. Carbon dioxide emissions are estimated to account for virtually all of buildings emissions. This share is overstated to the extent that all electricity emissions were assumed to be CO<sub>2</sub> for the purposes of analysis.<sup>24</sup> In fact, natural gas is a significant and growing contributor to the generation mix in British Columbia, currently accounting for 5% of electricity sold by BC Hydro.<sup>25</sup>

### **Annual Results**

In 2001, the energy intensity of Group A buildings dropped 3.5% and total emissions fell 500 tCO<sub>2</sub>e, due primarily to a significant reduction in fuel oil consumption (heating oil #2). The effect of lower fuel oil and natural gas consumption more than offset the increase in electricity emissions from slightly higher electricity use and a significantly higher emission factor. Energy savings can be attributed to the effect of early workshops in BCBC district offices to promote the Energy Management Program.

Energy intensity was down another 2.5% in 2002, and total emissions a further 16,200 tCO<sub>2</sub>e, as fuel oil consumption continued to fall, total floor space was reduced, and the electricity emission factor declined dramatically. Again, the improvement in energy intensity resulted from energy efficiency actions undertaken as part of the first phase of the EMP. BCBC staff and building operators were given checklists of no-cost/low-cost energy reduction measures that could be implemented in advance of the detailed audits and retrofits.

In 2003, there was a further 1.9% reduction in energy intensity and GHG emissions fell another 8,000 tCO<sub>2</sub>e. That year saw significant declines in natural gas, electricity, and propane consumption as well as an 8% reduction in floor space relative to 2002. In addition, energy savings from the audits and retrofits began to take effect, with the completion of retrofit projects at the Richard Blanshard Building in Victoria and the Courtenay Courthouse.

Additional retrofits in early 2004 contributed to another 1.7% decline in energy intensity and a further 2,900 tCO<sub>2</sub>e reduction in GHG emissions. Energy consumption and emissions were also down because of a 6% decline in floor space as well as warmer temperatures in 2004.

## **EMISSIONS FROM TRANSPORTATION**

### ***Emissions Reduction Commitment***

The new provincial climate change plan commits to establishing ministry- and agency-specific performance targets for the acquisition of cleaner vehicles, fuels, and transportation services. These targets will recognize progress made during the 2000-2004 period and will reflect the potential to further reduce GHG emissions through greater use of hybrid vehicles and biodiesel and ethanol blend fuels. For the purposes of future progress reports, the individual targets will be aggregated into a single cleaner transportation target for the government.

### ***Emissions Reduction Measures***

Over the 2001-2004 period, the government undertook some significant fleet measures that had the effect of reducing GHG emissions from what they otherwise would have been. In particular,

---

<sup>24</sup> BC Hydro's reporting of GHG emissions does not provide a breakdown by greenhouse gas or generation source.

<sup>25</sup> BC Hydro (2005), *2004 Greenhouse Gas Report*, p. 11.

fuel switching occurred out of gasoline and into lower-emitting propane and compressed natural gas (CNG). The Ministry of Transportation was primarily responsible for this activity in pursuit of its target for all new vehicle purchases from AFVs. This fuel switching built on previous achievements, including the acquisition of 61 hybrid vehicles in late 2000 and early 2001.

The total number of AFVs in the government fleet grew from 256 to 351 over the 2001-2004 period. In March 2005, the government announced incremental funding for the acquisition of up to 356 more hybrid vehicles by ministries in communities across the province. The funding is intended to help address the higher purchase price of hybrids and to demonstrate provincial leadership in the adoption of cleaner vehicles. By the end of 2005, the hybrid fleet had reached 119 vehicles.

### ***Estimation of Emissions***

The estimation of GHG emissions from transportation is based on fleet fuel consumption data collected on behalf of individual ministries and agencies by the government's contracted fleet services provider and compiled by the Ministry of Labour and Citizens' Services. These data specify consumption by fuel type and vehicle.<sup>26</sup>

To estimate annual emissions by greenhouse gas, the fuel usage by vehicle and fuel type was multiplied by the appropriate emission factors from CSA Climate Change, GHG Registries.<sup>27</sup> Emissions were then summed across the three greenhouse gases.

An estimate was included of the emissions from reimbursed employee travel using personal and rental vehicles. This estimate was taken from the previous progress report and was based on reimbursed and rental vehicle kilometres travelled (VKT) in 1999 and an average emission intensity of gasoline cars and light trucks (in tonnes of CO<sub>2</sub>e/VKT). Since the government only began recording information on personal vehicle mileage in 2003/04, the 1999 estimate was simply held constant for the 2000-2004 period. The information gathered over the past few years will be reviewed to develop a more up-to-date estimate for personal/rental vehicle emissions in the next progress report.

### ***Overview of Results***

The fuel consumption in government fleets and personal/rental vehicles, and their associated GHG emissions, are shown in Tables 5 and 6, respectively. Between 2000 and 2004, fleet gasoline use fell by an estimated 37.2%, while the consumption of alternative fuels (propane and CNG) increased significantly. At the same time, there was a major rise in diesel fuel consumption, up 92.8% over the same period.

Gasoline emissions were down 27.9% by 2004, with the combined effect of government restructuring and switching to other fuels. Between December 2000 and December 2004, the leased light vehicle fleet fell from 3,646 to 2,699 vehicles. This decline reflects both true

---

<sup>26</sup> The fuel types are gasoline, diesel, propane, and CNG. The vehicle types are car, light truck, medium truck, heavy truck, equipment, and "unspecified". Aviation fuel use is not reported (see below).

<sup>27</sup> CSA Climate Change, GHG Registries (2005), *Canadian GHG Challenge Registry Guide to Entity & Facility-Based Reporting*, Table 5. See Appendix A of this report.

**Table 5: Transportation Fuel Use by Fuel Type (litres)<sup>1</sup>**

<b>Fuel</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
Gasoline					
Government	12,349,700	10,654,900	8,915,900	8,542,200	7,759,100
Personal/rental	4,175,600	4,175,600	4,175,600	4,175,600	4,175,600
Total	16,525,300	14,830,500	13,091,600	12,717,800	11,934,700
Diesel	2,409,700	3,752,000	4,148,900	4,889,900	4,647,000
Propane	374,100	691,300	632,300	709,200	441,300
CNG	14,500	54,200	47,700	40,200	24,500
Total	19,323,600	19,328,000	17,920,500	18,357,100	17,047,500
Change over 2000		0.0%	-7.3%	-5.0%	-11.8%

<sup>1</sup>Excludes aviation fuel.**Table 6: Transportation Emissions by Fuel Type (tonnes CO<sub>2</sub>e)<sup>1</sup>**

<b>Fuel</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
Gasoline					
Government	30,700	26,500	22,200	21,200	19,300
Personal/rental	10,200	10,200	10,200	10,200	10,200
Total	40,900	36,700	32,400	31,400	29,500
Diesel	6,800	10,500	11,600	13,700	13,000
Propane	600	1,100	1,000	1,100	700
CNG	30	120	110	90	50
Total	48,200	48,400	45,100	46,300	43,200
Change over 2000		0.3%	-6.6%	-4.0%	-10.4%

<sup>1</sup>Excludes aviation fuel.

reductions in the fleet (i.e., a net reduction in GHG emissions overall) and the transfer of vehicles (and associated emissions) to outside organizations under alternative service delivery.

Diesel emissions almost doubled over the reporting period. The largest contributing factor to this growth was the continued conversion of the provincial ambulance fleet to diesel fuel, to improve reliability, performance, and safety.<sup>28</sup> In addition, over the past few years the Ministry of Forests has been moving to diesel units for its truck rentals during the fire season.

In total, GHG emissions from transportation declined by 5,000 tonnes CO<sub>2</sub>e (10.4%) through 2004, as the reduction in gasoline emissions was partially offset by the increase in diesel emissions.

Table 7 presents the emissions breakdown by greenhouse gas. As in the case of buildings, CO<sub>2</sub> accounts for the vast majority of GHG emissions from transportation.

**Table 7: Transportation Emissions by Greenhouse Gas (tonnes CO<sub>2</sub>e)<sup>1</sup>**

Gas	2000	2001	2002	2003	2004
Carbon Dioxide	46,200	46,400	43,300	44,500	41,600
Methane	100	100	100	100	80
Nitrous Oxide	2,000	1,900	1,700	1,700	1,600
Total	48,200	48,400	45,100	46,300	43,200

<sup>1</sup> Excludes aviation fuel.

### **Annual Results**

In 2001, transportation fuel use and GHG emissions rose very slightly. Reduced gasoline consumption and major increases in propane and CNG use were more than offset by the growth in diesel fuel as a result of the conversion of a large number of ambulances from gasoline. For the government hybrid fleet, 2001 marked the first full year of operation following their introduction in 2000.

Total fuel use and emissions fell by 7% in 2002, in large part because of fleet downsizing. While gasoline consumption was down 12% (offset by an 11% increase in diesel fuel), propane and CNG use also fell off because of downsizing in the Ministry of Transportation and limitations on the ability to purchase CNG due to consolidation in the number of service centres selling natural gas across the province.

In 2003, fuel use and emissions rose by 2% and 3%, respectively. Gasoline consumption continued to fall with the effects of fleet downsizing and CNG use also declined further. Diesel emissions were up 19% largely because of increased firefighting activity (Ministry of Forests trucks) due to the worst summer for forest fires in a half-century.

<sup>28</sup> Diesel fuel is less flammable than gasoline.

Fuel use and emissions dropped again by 7% in 2004. Fleet transfers out of the government were the major reason for the decline in gasoline consumption. Both propane and CNG use underwent substantial declines.

### **Aviation Fuel**

In previous submissions, aviation fuel was included in the calculation of total fuel consumption and GHG emissions for transportation. However, the purchase data were limited to fuel acquired through the government's vehicle fuel card program that can be used at many airport locations. Much of the fuel used to provide air ambulance, firefighting, and general charter service is acquired through other means and not compiled in a central database. In view of this incomplete picture, aviation fuel use has been removed from the emissions inventory (i.e., for the entire 2000-2004 period) for this report.

Over the coming year, the government will review whether it is feasible to more completely track aviation fuel use and emissions for the next progress report.

### **TOTAL EMISSIONS**

Total GHG emissions from buildings and transportation are shown in Table 9, with a breakdown of the total by greenhouse gas in Table 10.<sup>29</sup> In aggregate, the B.C. Government's emissions were estimated to be 32,700 tCO<sub>2</sub>e lower in 2004 than in 2000. This is equivalent to a decline of 23.9%, which already exceeds the preliminary 16% emissions reduction target (for 2005) in the 2000 Action Plan. The reduction in emissions has been achieved mainly through improved energy efficiency and a decline in occupied floor space in buildings, along with some vehicle fleet downsizing and fuel switching in transportation.

**Table 9: Total BC Government Emissions (tonnes CO<sub>2</sub>e)**

<b>Gas</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
Buildings	88,500	88,000	71,800	63,700	60,800
Transportation	48,200	48,400	45,100	46,300	43,200
Total	136,700	136,400	116,800	110,000	104,000
Change over 2000		-0.3%	-14.6%	-19.5%	-23.9%

<sup>29</sup> The buildings estimates for 2007 are excluded since there is currently no comparable projection or target year for transportation.

**Table 10: Total Emissions by Greenhouse Gas (tonnes CO<sub>2</sub>e)**

Gas	2000	2001	2002	2003	2004
Carbon Dioxide	134,200	134,000	114,700	107,900	102,100
Methane	100	100	100	100	100
Nitrous Oxide	2,400	2,300	2,100	2,000	1,900
Total	136,700	136,400	116,800	110,000	104,000

Going forward, the energy intensity target for buildings and the aggregate cleaner transportation target to be set under the provincial climate change plan will together constitute more appropriate commitments for reducing the government's emissions.

### ***Indirect Emissions***

The government tracks and reports on certain sources of indirect emissions (electricity and steam consumption in buildings and fuel used in personal and rental vehicles), but not on others, including emissions from employee commuting, the manufacture and shipment of supplies, energy consumed for water use, waste sent to landfills, and accidental releases of halocarbons. However, action is being taken to address some of these emissions sources. For example, under the climate change plan guidelines will be updated to encourage the purchase of less GHG-intensive office products and services.

## **MONITORING, REPORTING, AND PERFORMANCE MEASUREMENT**

The Ministry of Labour and Citizens' Services tracks fuel consumption in vehicles, from which GHG emissions are estimated. Once clean transportation targets have been determined under the climate change plan, ministries and agencies will monitor and report annually on their progress towards meeting them.

BCBC monitors energy consumption and GHG emissions from buildings using the Building Energy Performance Index generated by the Energy Accounting System. Overall building energy intensity, as measured by the aggregate BEPI, is one of the Corporation's performance measures. Energy reductions from the retrofits are being tracked and verified by comparing the BEPI for an individual building before and after retrofit implementation. In addition, as a Power Smart partner, BCBC is required to report to BC Hydro on the electricity savings from retrofit measures, which are then reviewed and verified by technical consultants.

In future, the government anticipates submitting its progress report on GHG emissions annually.

---

## REFERENCES

- British Columbia Buildings Corporation. 2005. *2003-2004 Progress Report on Energy Efficiency and Greenhouse Gas Reduction*. Report Prepared for the Canadian GHG Challenge Registry. Victoria: Technical Value Department, June.
- \_\_\_\_\_. 2004. *An Action Plan for Energy Efficiency and Greenhouse Gas Reduction*. Victoria: Technical Value Department, February.
- BC Hydro. 2005. *2004 Greenhouse Gas Report*. Vancouver: Corporate Sustainability, March.
- \_\_\_\_\_. 2003. *2003 Greenhouse Gas Report*. Vancouver: Corporate Sustainability, December.
- BC Public Service Agency. 2005. *2004/05 Annual Service Plan Report*. Victoria: BCPSA, June.
- Canadian Standards Association. 2005. *Canadian GHG Challenge Registry Guide to Entity & Facility-Based Reporting*. Version 4.0. Ottawa: CSA Climate Change, GHG Registries, February.
- Ministry of Water, Land and Air Protection. 2002. *Indicators of Climate Change for British Columbia*. Victoria: Water, Air and Climate Change Branch, March.
- Province of British Columbia. 2004. *Weather, Climate and The Future: B.C.'s Plan*. Victoria: Ministry of Water, Land and Air Protection, December.
- \_\_\_\_\_. 2004. *Guidelines for Procurement of Environmentally Responsible Products and Services*. Victoria: Procurement Governance Office, Office of the Comptroller General, Ministry of Finance.
- \_\_\_\_\_. 2004. *Budget and Fiscal Plan 2004/05 – 2006/07*. Victoria: Ministry of Finance, February.
- \_\_\_\_\_. 2001. *British Columbia VCR Progress Report*. Victoria: Ministry of Water, Land and Air Protection, October.
- \_\_\_\_\_. 2000. *British Columbia VCR Action Plan 2000*. Victoria: Ministry of Environment, Lands and Parks, November.

## Appendix A: Emission Factors

Tables A.1 through A.3 present the emission factors used to convert from Gigajoules of energy consumption to tonnes of CO<sub>2</sub>-equivalent GHG emissions. Emission factors for fuels are calculated from the 2005 Canadian GHG Challenge Registry Guide.<sup>30</sup> Electricity emission factors are derived from BC Hydro's 2003 *Greenhouse Gas Report* for all years except 2003 and 2004, which are taken or estimated, respectively, from its 2004 *Greenhouse Gas Report*.<sup>31</sup>

**Table A.1: Emission Factors for Fuels Used in Buildings (tCO<sub>2</sub>e/GJ)**

Gas	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Natural Gas	0.0496	2.0396 * 10 <sup>-05</sup>	2.6854 * 10 <sup>-04</sup>
Diesel	0.0706	7.0579 * 10 <sup>-05</sup>	3.2058 * 10 <sup>-03</sup>
Heating Oil #2	0.0732	1.4116 * 10 <sup>-05</sup>	2.4845 * 10 <sup>-04</sup>
Heating Oil #5	0.0740	2.8684 * 10 <sup>-05</sup>	4.7544 * 10 <sup>-04</sup>
Steam (1)	0.0764	3.1379 * 10 <sup>-05</sup>	4.1313 * 10 <sup>-04</sup>
Propane	0.0588	1.9772 * 10 <sup>-05</sup>	1.3135 * 10 <sup>-03</sup>

<sup>1</sup> The emission factor for steam is calculated by dividing the natural gas emission factor by 0.65, based on the assumption that steam is supplied at a 65% level of efficiency.

**Table A.2: Emission Factors for Electricity**

	Tonnes CO <sub>2</sub> e/GWh	Tonnes CO <sub>2</sub> e/GJ
2000	46	0.0128
2001	63	0.0175
2002	25	0.0069
2003	22	0.0061
2004 (1)	28	0.0076
2007 (2)	55	0.0154

<sup>1</sup> Average of 2003 and 2005 forecast values.  
<sup>2</sup> Linear interpolation between 2005 and 2010 forecast values.

<sup>30</sup> Canadian Standards Association (2005), *Canadian GHG Challenge Registry Guide to Entity & Facility-Based Reporting*, Tables 3, 5 and 16.

<sup>31</sup> BC Hydro (2003), *2003 Greenhouse Gas Report*, and BC Hydro (2005), *2004 Greenhouse Gas Report*.



**Table A.3: Emission Factors for Transportation Fuels (kg/litre)**

<b>Vehicle (Fuel)</b>	<b>CO<sub>2</sub></b>	<b>CH<sub>4</sub></b>	<b>N<sub>2</sub>O</b>
Car (Gasoline)	2.360	0.00012	0.00026
Car (Diesel)	2.730	0.00005	0.00020
Light Truck (Gasoline)	2.360	0.00022	0.00041
Light Truck (Diesel)	2.730	0.00007	0.00020
Propane Vehicles	1.500	0.00052	0.00028