

CHAPTER 2: ENERGY AND THE CANADIAN ECONOMY

2.1. CHAPTER SUMMARY

- Energy is an important sector of the Canadian economy. It accounted for 7.2 percent of total Canadian gross domestic product (GDP) in 2006.
- The energy sector is a source of well-paying jobs for Canadians.
 - It employed some 273 000 people in 2006, representing 1.9 percent of total Canadian employment.
 - In 2006, average wages and salaries in the energy sector were 73.1 percent higher than the national average.
- Energy products are key contributors to Canada's merchandise trade.
 - In 2006, Canada exported nearly \$91 billion in energy products. Total energy exports now represent 20.7 percent of all Canadian merchandise exports.
 - Canada is a net exporter of energy products. The energy sector's \$53.6-billion trade surplus in 2006 remains a key contributor to Canada's overall merchandise trade surplus.
- The energy sector is capital intensive, providing economic stimulation to other industries, such as construction and manufacturing. In 2005, it accounted for 20 percent of all capital investment and repair expenditures throughout Canada's economy.
- The cost of energy, which has been rising in recent years, affects other segments of the Canadian economy.
 - Energy costs as a percentage of total costs (excluding capital costs) are just under the 4 percent mark for the manufacturing sector. For energy-intensive industries, however, the share is much higher.
 - In 2006, the average Canadian household spent 9.6 percent of its disposable income on energy, compared with 8.8 percent in 1997.
- Governments receive significant revenues from energy. For instance, revenues from federal, provincial and territorial income tax on the energy sector amounted to \$7.25 billion in 2005. That amount represented more than 15 percent of income tax paid by all corporations that year.

2.2. INTRODUCTION

Energy has a profound impact on the performance of the Canadian economy. This impact arises from direct economic contribution (by the energy sector), indirect contribution (by industries that serve the energy sector) or tertiary contributions (by industries that are not related to the energy sector but are intensive users of energy in their production processes).

The energy sector is important to the Canadian economy as a source of employment, wealth creation and government revenues; as a destination for investment; and for its contribution to a positive net trade balance.

The energy sector is typically defined as the collection of the following industries as classified by the North American Industry Classification System (NAICS) 2007:¹⁴

- Oil and gas extraction (NAICS 211)
- Coal mining (NAICS 2121)
- Other metal ore mining (NAICS 21229)
- Support activities for mining and oil and gas extraction (NAICS 213)
- Electric power generation, transmission and distribution (NAICS 2211)
- Natural gas distribution (NAICS 2212)
- Petroleum refineries (NAICS 32411)
- Other petroleum and coal product manufacturing (NAICS 32419)
- Pipeline transportation (NAICS 486)

For this analysis, unless otherwise noted, “energy sector” refers to a slightly modified version of the “typical” definition due to data limitations.¹⁵

As well, the energy sector requires specialized machinery, equipment, steel pipes, and other goods and services that are unique to the energy sector and are provided by other sectors. The economic contribution of these industries on the Canadian economy (e.g. in terms of GDP, employment) is not captured in this definition of energy sector. Instead, much of this economic activity is captured in other sectors of the economy, such as construction, manufacturing and transportation.¹⁶

2.3. ENERGY SECTOR'S CONTRIBUTION TO THE CANADIAN ECONOMY

2.3.1. Gross domestic product

GDP (measured in 2002 constant prices)¹⁷ in the energy sector has been growing at an annual rate of 1.1 percent per year since 1997. It reached \$86.4 billion (in 2002 dollars) in 2006 (see Table 2.1). The oil and gas extraction (\$41.8 billion) and the electric power generation, transmission and distribution (\$25.1 billion) industries were the largest contributors to output in this sector. Despite this modest growth, the energy sector's share of Canadian economic output has slipped slightly. It accounted for 7.2 percent of Canadian GDP in 2006.

2.3.2. Employment

Canada's energy sector employed some 273 000 people in 2006, representing 1.9 percent of Canadian employment.¹⁸ Growth in employment in the sector averaged 3.2 percent per annum over 1997–2006 compared with 2.1 percent employment growth across the Canadian economy.

With more than 94 000 employees in 2006, the electric power generation, transmission and distribution industry led all energy sector industries in total employment. Employment in the support activities for mining and oil and gas extraction industry reached 82 150 in 2006 – more than double its employment level of nearly 40 200 in 1997. This translates into a compound annual growth rate (CAGR) of 13.6 percent over 1997–2006.

TABLE 2.1: ENERGY SECTOR GDP AND EMPLOYMENT BY INDUSTRY, CANADA, 2006

NAICS code	Industry	GDP (in millions of 2002 dollars)	Employment
211	Oil and gas extraction	41,832	49 670
2121	Coal mining	891	5 458
213	Support activities for mining and oil and gas extraction	6,397	82 159
2211	Electric power generation, transmission and distribution	25,126	94 062
2212	Natural gas distribution	3,120	14 497
324	Petroleum and coal product manufacturing	3,450	22 608
486	Pipeline transportation	5,617	4 661
	Total energy sector	86,433	273 115
	All industries	1,195,470	14 041 306
	Energy-sector share	7.2%	1.9%

Source: Statistics Canada, Canadian Socio-Economic Information Management System (CANSIM) database (2007), Table 281-0024 and Table 281-0027.

2.3.3. Wages and salaries

The energy sector is a source of highly paid jobs. In 2006, average wages and salaries in Canada's energy sector were 73.1 percent higher than the national average.^{19,20} Moreover, wages and salaries in the sector have been growing at a faster rate than those in the economy as a whole. Since 1997, average wages and salaries in the energy sector have grown at a CAGR of 2.6 percent, compared with 2.0 percent growth for the entire economy over the same period. In 2006, wages and salaries in the energy sector grew by 3.3 percent, compared with a growth of 3.0 percent across all industries.

Historically (since 1997) workers in the oil and gas extraction industry were, on average, the best paid among energy sector workers. This was still the case in 2006 where, on average, these workers earned 25 percent more than the average worker in the energy sector and nearly 2.2 times more than the average Canadian worker.

2.3.4. Trade in energy products

Exports

In 2006, Canada exported more than \$91 billion in energy products – a decrease of 0.9 percent from the previous year (see Table 2.2).²¹ Total energy exports now represent 20.9 percent of Canadian merchandise exports. Exports of crude oil and natural gas account for 71.7 percent of all energy exports. Each of these products experienced double-digit annual growth rates (14.3 percent and 17.2 percent respectively) over 1997–2006.

Imports

Total imports of energy products reached \$37.2 billion in 2006 – a 4.1 percent increase from 2005. In 2006, imports of crude oil represented 62.6 percent of total imports of energy products and 5.9 percent of total Canadian merchandise imports.

Trade balance

Canada is a net exporter of energy products. Since 1997, it has consistently been running a positive trade surplus in total energy products. Despite a 4.1 percent decline from 2005, the energy sector's \$54.5-billion trade surplus in 2006 remained a key contributor to Canada's merchandise trade surplus. In absolute terms, natural gas recorded the largest surplus, at \$25.5 billion, whereas Canada's trade surplus in crude oil witnessed the energy sector's largest year-over-year growth (up 83.1 percent from 2005).

TABLE 2.2: TRADE IN ENERGY PRODUCTS, CANADA, 2006

Product	Exports (in millions of dollars)	Imports (in millions of dollars)	Balance (in millions of dollars)
Coal	3,321	1,290	2,031
Coal products	357	116	241
Refined petroleum products	14,688	8,204	6,484
Crude oil	37,955	23,316	14,639
Electricity	2,493	1,177	1,316
Uranium	2,170	440	1,730
Liquid petroleum gases	2,973	339	2,634
Natural gas	27,798	2,351	25,447
Total energy products	91,755	37,233	54,622
Total merchandise	439,545	396,443	43,102
Energy products' share of merchandise	20.9%	9.4%	126.7%

Source: Natural Resources Canada (NRCan), Trade Retrieval and Aggregation System (TRAGS) (2007), based on Statistics Canada, *Canadian International Merchandise Trade*, Cat. No. 65-001-XIB.

2.3.5. Capital and repair expenditures

Canada's energy sector is capital intensive, providing economic stimulation to other industries, such as construction and manufacturing.²² In 2005, the sector spent \$65.6 billion in total capital and repair expenditures – a 24.6 percent increase from 2004 (see Table 2.3). By contrast, total capital and repair expenditures for the Canadian economy increased by 8.7 percent from 2004. In 2005, Canada's energy sector accounted for 20 percent of all such expenditures throughout the entire economy. Capital and repair expenditures in the sector increased at a CAGR of 9.5 percent between 1997 and 2005, compared with 5.9 percent for the economy as a whole.

The oil and gas extraction industry was responsible for two thirds of all capital and repair expenditures in the energy sector in 2005. At the same time, the electric power generation, transmission and distribution industry accounted for another 19 percent of the sector's expenditures. Within the oil and gas extraction industry, more than one third of the capital expenditures was directed toward conventional developmental drilling in 2005. For oil sands activities (non-conventional extraction), expenditures on in-situ capital more than doubled between 2004 and 2005. They accounted for nearly 10 percent of all capital expenditures within this industry.

Capital construction accounts for the largest share (68.5 percent) of all capital and repair expenditures in the energy sector. In 2005, the sector invested \$45 billion in capital construction, a 27.5 percent increase from the previous year.

TABLE 2.3: CAPITAL AND REPAIR EXPENDITURES BY THE ENERGY SECTOR, CANADA, 2005

NAICS code	Industry	Capital expenditures (in millions of dollars)	Repair expenditures (in millions of dollars)	Total capital and repair expenditures (in millions of dollars)
211	Oil and gas extraction	42,047.9	1,807.5	43,855.5
2121	Coal mining	605.9	n/a	n/a
213	Support activities for mining and oil and gas extraction	2,681.8	666.8	3,348.6
2211	Electric power generation, transmission and distribution	9,814.1	2,629.8	12,443.9
2212	Natural gas distribution	1,158.2	134.8	1,293.0
324	Petroleum and coal product manufacturing	2,759.3	663.9	3,423.2
486	Pipeline transportation	838.5	443.2	1,281.7
	Total energy	59,905.7	6,346.0	65,645.9
	All industries	273,225.3	54,306.0	327,531.3
	Energy-sector share	21.9%	11.7%	20.0%

Source: Statistics Canada, CANSIM database (2007), Table 029-0007.

2.4. ROLE OF ENERGY IN THE REST OF THE ECONOMY

The recent rise in commodity prices has clearly been beneficial to oil and gas producers. But it has had a negative effect on other segments of the economy. Certain energy-intensive industries have been particularly affected by the recent increases in fuel costs. These industries include the following:

- Pulp, paper and paperboard mills (NAICS 3221)
- Iron and steel mills and ferro-alloy manufacturing (NAICS 3311)
- Alumina and aluminum production and processing + Non-ferrous metal (except aluminum) production and processing (NAICS 3313+ 3314)
- Chemical manufacturing (NAICS 325)

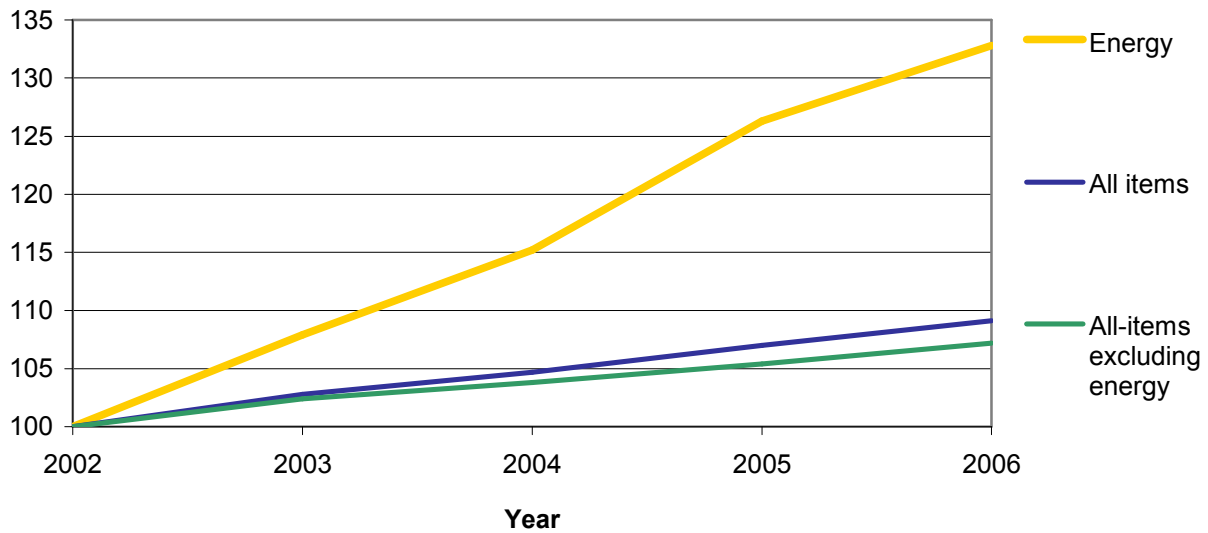
Between 1997 and 2003, energy costs as a percentage of total costs (excluding capital costs) hovered at 3 percent for the manufacturing sector. Between 2003 and 2005, energy costs as a percentage of total costs increased, approaching 4 percent in 2005. For the energy-intensive industries (listed above), energy costs as a share of total costs for manufacturing activities are higher. In general, over 1997–2003, energy costs grew. For example, in 2003, this share was 17.6 percent in the pulp, paper and paperboard mills industry and 12.6 percent in the iron and steel and ferro-alloy manufacturing industry.²³

Between 2003 and 2005, energy costs as a percentage of total costs for these energy-intensive industries increased at a faster rate than those for the manufacturing sector. With the exception of the iron and steel and ferro-alloy manufacturing industry, the share of energy costs increased by roughly 1.5 percentage points for all other energy-intensive industries in this period.

Recent increases in energy costs are also having an impact on consumers. Between 2002 and 2006, the energy price index increased by nearly 33 percent (see Figure 2.1). Although energy carries a weight of roughly 9 percent of the total consumer price index (CPI), its strong growth over 2002–2006 resulted in a total CPI that is nearly 2 percentage points higher than the CPI that excludes energy.²⁴

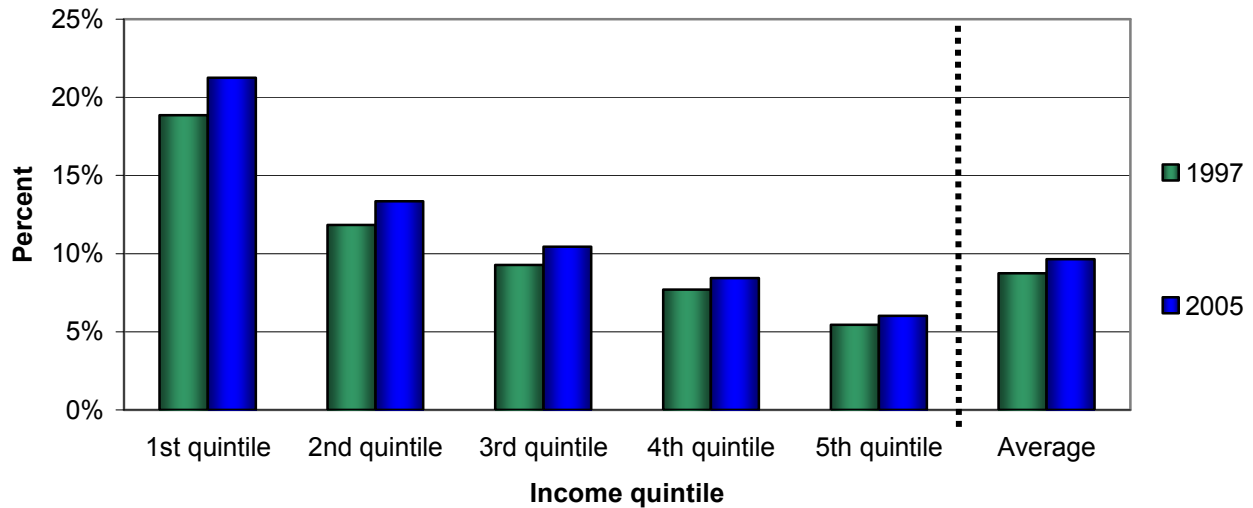
In 2005, the bottom 20 percent (i.e. the first quintile) of Canadian households (in terms of total household income) spent more than 21.3 percent of their disposable income on heating and lighting their homes and on fuels for transportation (up from 18.9 percent in 1997) (see Figure 2.2).²⁵ The average household spent 9.6 percent of its disposable income on energy, compared with 8.8 percent in 1997. Higher prices for energy products reduce the purchasing power for consumers, thus reducing growth in real consumer spending.

FIGURE 2.1: GROWTH OF THE CONSUMER PRICE INDEX
(2002 = 100)



Source: Statistics Canada, CANSIM database (2007), Table 326-0021.

FIGURE 2.2: PERCENTAGE OF DISPOSABLE INCOME SPENT ON ENERGY



Source: Statistics Canada, Detailed Average Household Expenditure by Household Income Quintile for Canada and Provinces, (Cat. No. 62F0032XDB).

2.4.1. Government revenues and expenditures

Government revenues from federal, provincial and territorial income tax on the energy sector were \$7.25 billion in 2005 (see Table 2.4). That amount represented more than 15 percent of federal, provincial and territorial income tax paid by all corporations that year. In 2001, federal, provincial and territorial income tax receipts from the energy sector were \$4 billion, representing 11 percent of total corporate income taxes paid. Between 2001 and 2005, the \$3-billion increase in corporate income taxes paid by the energy sector accounted for about 30 percent of the increase in total corporate taxes.

TABLE 2.4: ENERGY SECTOR: FEDERAL, PROVINCIAL AND TERRITORIAL CORPORATE INCOME TAXES, ROYALTIES AND LAND SALES

Industry	2001	2002	2003	2004	2005
	millions of dollars				
<i>Oil and gas extraction and support activities</i>					
Federal income tax	967	1,055	1,180	2,504	2,598
Provincial/territorial income tax	441	488	444	1,034	1,151
Total income tax	1,408	1,542	1,625	3,538	3,749
Royalties and land sales	14,485	9,435	12,994	14,246	19,894
Total income tax and royalties	15,893	10,997	14,619	17,884	23,643
<i>Petroleum and coal products manufacturing</i>					
Federal income tax	1,347	1,244	724	1,179	1,596
Provincial/territorial income tax	676	532	329	463	724
Total income tax	2,023	1,777	1,053	1,642	2,321
<i>Utilities</i>					
Federal income tax	214	568	554	451	350
Provincial/territorial income tax	96	238	205	227	173
Total income tax	311	807	758	678	522
<i>Pipelines</i>					
Federal income tax	194	298	316	356	431
Provincial/territorial income tax	88	134	127	196	227
Total income tax	283	431	444	553	658
Total energy sector					
Federal income tax	2,722	3,165	2,774	4,490	4,975
Provincial/territorial income tax	1,301	1,392	1,105	1,920	2,275
Total income tax	4,023	4,557	3,880	6,411	7,250
Royalties and land sales	14,485	9,435	12,994	14,246	19,894
Total corporate taxes, royalties and land sales	18,510	13,992	16,874	20,757	27,144
<i>Total all industries</i>					
Federal income tax	24,174	24,091	28,000	31,433	31,489
Provincial/territorial income tax	11,469	11,060	11,703	14,288	15,003
Total income tax	35,643	35,151	39,703	45,722	46,492

Sources:

Statistics Canada, *Oil & Gas Extraction* (2006), (Cat. No. 26-213), for royalties and crown land sales data.

Statistics Canada, *Financial and Taxation Statistics for Enterprises 2005* (2007), (Cat. No. 61-219), for federal, provincial and territorial income tax data.

Income taxes are profit based. Rising corporate income taxes paid by the energy sector reflect growing profits in the sector. The energy sector's operating profits rose from \$39 billion in 2001 to \$59 billion in 2005. In 2005, of the top five industries ranked by operating profits, energy industries

accounted for three of them – oil and gas extraction and support activities, utilities, and petroleum and coal products manufacturing.

Royalties and land sales are an important source of revenue for governments. In 2005, the oil and gas industry paid nearly \$20 billion in royalties and land sales. Royalty payments are subject to large swings, e.g. in 2002, the oil and gas industry paid \$9.4 billion in royalties – a 30 percent drop from the previous year.

Governments also receive energy-related revenues through other means, including dividends from Crown-owned electric utilities, and sales and excise taxes.

Governments also incur expenditures that benefit the energy sector. These expenditures include direct spending on government programs and energy-related tax incentives and spending on broad areas of government activities, such as public infrastructure, human resources development, education, health care and international relations.

Following is an overview of the federal corporate income tax system, including special features that apply to energy.

2.4.2. Federal corporate income tax for energy

Federal corporate income taxes are determined by applying the applicable tax rate to taxable income calculated according to the *Income Tax Act*. Income tax rules broadly follow generally accepted accounting principles. Assets are placed in specific capital cost allowance (CCA) classes. These classes specify the rate at which the asset may be deducted. In general, CCA rates reflect the economic life of the assets in that CCA class.

Some features of the tax system promote certain types of activity. The Scientific Research and Experimental Development Tax Incentive Program provides a tax credit for qualifying research and development (R&D) spending, and a number of energy industries are important users of this program. And the Atlantic investment tax credit promotes investment in Atlantic Canada. Several energy production activities qualify for this credit, although oil-and-gas exploration and development and pipeline expenses do not.

Specific features

A number of specific income tax measures apply to energy industries.

The oil and gas sector has specific provisions (reflecting the special characteristics of the industry). It can deduct exploration, development and oil-and-gas property expenses. Oil and gas exploration and development expenses are also eligible for flow-through share treatment, whereby a corporation can flow out the eligible deductions to an investor. This tax treatment is designed to help small exploration companies raise capital.

In recent years, the tax treatment of the oil and gas sector has been undergoing fundamental reforms. Royalties are now fully deductible, and the resource allowance, a special deduction permitted in lieu of royalty deductibility, has been phased out. As well, corporate tax rates for the oil and gas sector, which had been higher than those for other industries, have been brought into line with the general corporate rate. Finally, the accelerated CCA for oil sands mining and in situ projects, which permitted companies a fast write-off of certain kinds of assets, will be phased out, as announced in Budget 2007.

The tax treatment of electricity-generating equipment has also undergone important changes. CCA rates have been increased to better reflect the economic life of the different assets. Also, a range of renewable energy and energy conservation equipment has been given an accelerated deduction – to encourage clean energy production and to contribute to the government’s economic and environmental objectives.

Moreover, a new category of expense was introduced in the 1996 budget to make the tax treatment of certain types of renewable and conservation expenses more consistent with oil-and-gas exploration expenses. Included in this category are intangible expenses associated with developing such projects as wind farms, small-scale hydroelectric installations and co-generation systems (e.g. for process engineering, right of access to the project site, test wind turbines). These expenses are immediately deductible and are also eligible for flow-through shares.

2.4.3. Federal energy programming

Following is an overview of energy-related federal programming.

The Government of Canada is responsible for the interprovincial/inter-territorial and international movements of energy and energy goods, resource management on frontier lands, and uranium and nuclear power. It is also concerned with energy matters on policies of national interest, such as economic development and security. The government has actively promoted energy efficiency and alternative energy since the energy crises of the 1970s. Over time, the policy rationale for federal involvement in these areas has expanded to include trans-boundary environmental concerns, principally climate change.

To address its responsibilities, the Government of Canada has used legislative and regulatory instruments. For instance, it set up regulatory boards (e.g. the National Energy Board, the Canadian Nuclear Safety Commission), created Atomic Energy Canada Limited and enacted the *Energy Efficiency Act*. The Act allows the government to regulate the efficiency of energy-using equipment and appliances. More recently, the Government of Canada announced its intention to regulate greenhouse gas (GHG) emissions and air pollutants from large industrial emitters, including the energy sector.

The Government of Canada also invested in various targeted energy programs. For instance, the long-standing Program of Energy Research and Development (PERD) provides funding for R&D aimed at ensuring a sustainable energy future for Canada. Through PERD, funds are allocated to 13 federal departments and agencies. In turn, these organizations support energy R&D activities in federal laboratories, the private sector, associations, universities and provincial and territorial research organizations. And Natural Resources Canada's CANMET Energy Technology Centre is a major R&D performer. It develops and delivers knowledge and technology-based programs for sustainable energy production and use through its facilities in Varennes, Qc.; Ottawa, On.; and Devon, Ab.

The Government of Canada is pursuing an integrated strategy to address climate change and air pollution through its Clean Air Agenda. The centrepiece of this approach is mandatory national regulation of greenhouse gas (GHG) and air pollutant emissions from major sources – industry, transportation, and consumer and commercial products. To complement its regulatory framework, the government has also introduced a series of measures to help Canadians use energy more efficiently, boost renewable energy supplies, and develop cleaner technologies. A number of these programs are being delivered by Natural Resources Canada under the ecoENERGY banner.

The ecoENERGY Efficiency Initiative promotes smarter energy use. It supports energy efficiency improvements in homes, small buildings and industry. It includes three program components:

- ecoENERGY for Buildings and Houses encourages the construction, operation and retrofit of more energy-efficient houses and buildings through a range of complementary activities, such as rating, labelling and training.
- ecoENERGY Retrofit provides direct incentives to homeowners and small and medium-sized businesses to invest in energy efficiency retrofits.
- ecoENERGY for Industry encourages the accelerated uptake of energy-saving investments by Canadian industry. It promotes the transfer of knowledge, new technologies and best practices.

The ecoENERGY Technology Initiative funds research, development and demonstration of next-generation clean energy technologies. These technologies are needed to reduce the emissions from energy production and use.

The ecoENERGY Renewable Initiative supports electricity and heat production from renewable sources through two program components:

- ecoENERGY for Renewable Power offers an incentive on the production of electricity from renewable sources to stimulate up to 4000 megawatts of renewable power. Eligible sources include wind, solar and biomass power.
- ecoENERGY for Renewable Heat supports the increased use of renewable energy technologies in space heating and cooling and water heating in residential and commercial buildings.

In addition, the government is delivering the ecoTRANSPORT Strategy which includes a series of initiatives designed to reduce the environmental impacts of transportation and secure Canada's future prosperity and competitiveness, by making the transportation system more sustainable, both economically and environmentally.

- ecoENERGY for Personal Vehicles gives consumers information on fuel consumption and decision-making tools, such as vehicle labels, guides and information, to encourage more fuel-efficient buying, driving and maintenance practices.
- ecoENERGY for Fleets introduces fleets to energy-efficient practices that can reduce fuel consumption and emissions.
- ecoAUTO Rebate Program gives Canadians rebates on the purchase of more fuel-efficient vehicles (available on 2006, 2007 and 2008 model year vehicles bought by December 31, 2008). The ecoAUTO Rebate Program is part of the Vehicle Efficiency Incentive (VEI). The VEI includes a performance-based fee on the most fuel-inefficient vehicles available in Canada.

For 2011 model-year vehicles, the government is developing fuel consumption regulations that are benchmarked against a stringent, dominant North American standard. The federal commitment is to develop made-in-Canada standards that will achieve, at a minimum, the U.S. goal of 35 miles per gallon – or 6.7 litres per 100 kilometres – for the average fuel economy of vehicles sold in 2020.

As well, the Government of Canada announced a \$2-billion Renewable Fuels Strategy. Regulations will require a 5 percent renewable fuel content based on the gasoline pool by 2010 and a 2 percent

renewable fuel content in diesel fuel and heating oil by 2012. The strategy also includes three program components:

- ecoENERGY for Biofuels offers an incentive for producing renewable alternatives to gasoline and diesel.
- ecoAGRICULTURE Biofuels Capital (ecoABC) provides a capital incentive for renewable fuels' facilities owned by farmers.
- Sustainable Development Technology Canada is receiving funding for the NextGen Biofuels Fund. This fund supports the large-scale demonstration of production facilities for next-generation renewable fuels.

A \$1.5 billion clean air and climate change trust fund supports provincial and territorial projects for reducing GHG and CAC emissions, including projects directly related to energy efficiency and the development and deployment of clean energy technologies.

In Budget 2008, the Government of Canada announced additional energy investments, including \$250 million for carbon capture and storage in the coal-fired electricity sector and \$300 million for nuclear energy.