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## Analytical Paper

### Analysis in Brief

# Canada, a Big Energy Consumer: A Regional Perspective

by Marinka Ménard

Manufacturing, Construction and Energy Division  
11th Floor, Jean Talon Building, Ottawa, K1A 0T6

Telephone: 1 800 263-1136



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**Marinka Ménard**

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National Enquiry Line: 1 800 263-1136

E-Mail inquiries: [analysisinbrief-analyseebref@statcan.ca](mailto:analysisinbrief-analyseebref@statcan.ca)

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# Canada, a Big Energy Consumer: A Regional Perspective

**Marinka Ménard**  
**Manufacturing, Construction and Energy Division**

## Summary

Canada is a huge consumer of energy. In 2002, it ranked almost equal to the United States for first place among the G-8 nations, the eight most industrialized countries in the world, in terms of per capita energy consumption.

Canadians consume nearly three times as much energy as Italians, who ranked last among the G-8 countries. That's because of our long travel distances, our long winters, and an economy based partly on high energy consuming industries, such as mining, forestry, petrochemical, pulp and paper, aluminium smelters, refining and steel manufacturing.

Between 1990 and 2003, our total energy consumption rose 23% from 8,549 petajoules to 10,477 petajoules, fuelled by a growing population and especially by economic growth. One petajoule equals roughly the amount of energy required to operate the Montréal subway system for a year.

This study examines Canada's higher energy consumption in the different regions of the country between 1990 and 2003. The increase is compared to variations in population and economic activity.

Energy consumption rose in all regions, with the biggest gain being in Alberta (+38%). This increase was attributable to two factors: a 24% surge in Alberta's population and economic expansion based on energy-consuming industries, especially development of petroleum oil sands. In 2003, its energy consumption per capita was 2.5 times the national average.

Saskatchewan recorded the second-highest increase in energy consumption (+34%), and Quebec the third highest with an increase of 20%, half of which was attributable to primary electricity, essentially hydroelectricity. In 2003, primary electricity represented 39% of Quebec's total consumption.

Total energy consumption in Ontario rose 17%, in British Columbia by 16% and in the Atlantic provinces by 16% between 1990 and 2003. In Ontario and British Columbia, growing populations played a major role, while in the Atlantic Provinces the demands of industry were the main factors.

The Northern Region and Manitoba had the lowest increase in energy consumption, rising only 3% during the 13-year period.

Canada has made a commitment under the Kyoto Protocol to reduce greenhouse gas emission by 6%. However, nearly all of the energy consumed in Canada comes from fossil fuels of non-renewable resources, namely refined petroleum products, natural gas and coal, which release the most greenhouse gases when combusted. These three accounted for 87% of consumption in 2003, up from 85% in 1990.

**Petajoules?**

The energy content of a 30-litre tank of gasoline is about one gigajoule. One million gigajoules is equal to one pétajoule. On average, Canada consumes about one pétajoule of energy every 50 minutes for all uses.

A thousand megajoules equal one gigajoule. A thousand gigajoules equal one terajoule. A thousand terajoules equal one pétajoule.

**Canada: A big consumer of energy from non-renewable resources**

Canada is a big consumer of energy. In 2002, Canada ranked almost equal to the United States for first place among the eight most industrialized countries in the world (G-8) in terms of per capita energy consumption.<sup>1</sup> Canadians consume almost three times as much energy as the Italians, who ranked last among G-8 countries.

**Energy consumption per capita in G-8 countries, 1990 and 2002**

1990		Rank	2002	
G-8 countries	Terajoule per person		G-8 countries	Terajoule per person
United States	0.3300	1	United States	0.3411
Canada	0.3231	2	Canada	0.3407
G-8 average <sup>1</sup>	0.2050		G-8 average <sup>1</sup>	0.2198
U.S.S.R.	0.1995	3	France	0.1860
Germany	0.1921	4	Russia	0.1836
France	0.1673	5	Germany	0.1798
United Kingdom	0.1578	6	Japan	0.1736
Japan	0.1545	7	United Kingdom	0.1638
Italy	0.1151	8	Italy	0.1274

1. The G-8 average is used as a common based for comparison purposes even though it did not exist in 1990.

**Source:** International Energy Agency, special tabulation received December 6, 2004.

Factors such as long travel distances for the movement of people and goods, prolonged heating and lighting in winter as well as an economy partly based on high energy consuming industries (mining, forestry, petrochemical, pulp and paper, aluminium smelters, refining and steel manufacturing) contribute to Canada's energy consumption.<sup>2</sup>

1. International Energy Agency, special tabulation received December 6, 2004.

2. Centre for Energy, *Energy consumption and the environment*, [www.centreinfo-energie.com](http://www.centreinfo-energie.com) (accessed on November 23, 2004).

Total energy consumption in Canada increased in the past 13 years, fuelled by a growing population (+14%) and especially by economic growth (+43%).<sup>3</sup> Between 1990 and 2003, Canada's total energy consumption increased by 23% rising from 8,549 petajoules to 10,477 petajoules.

Nearly all of the energy consumed in Canada between 1990 and 2003 came from fossil fuels of non-renewable resources, namely refined petroleum products, natural gas and coal.

Consumption of these energies that emit large quantities of greenhouse gases increased over this 13-year period. The increase amounted to 19% for petroleum products, 36% for natural gas and 16% for coal. This has added to the challenge of meeting Canada's goal of reducing greenhouse gas emissions to 6% below 1990 levels agreed to under the Kyoto Protocol.<sup>4</sup>

Canada's Kyoto objective can be achieved by reducing energy consumption or by substituting energy types that emit fewer greenhouse gases, like coal to natural gas. At the national level, a slight substitution can be seen in the type of energy consumed between 1990 and 2003. An increase in natural gas consumption has meant small reductions in consumption of refined petroleum products and primary electricity (hydroelectricity and nuclear).

Refined petroleum products were most in demand in Canada both in 1990 and in 2003, representing 40% of energy use. Consumption of refined petroleum products rose by 19%, accounting for one third of the increase in Canada's total energy consumption.

Use of natural gas as an energy source increased greatly between 1990 and 2003. Half of the total increase in Canada's energy use results from higher consumption of natural gas. There are many reasons for this increased consumption: greater use of natural gas for extraction and refining of petroleum from Alberta's oil sands and for transformation into electricity, substitution at the industrial level of natural gas as a source for cogeneration of power and residential development.

The number of natural gas electric plants in use in Canada more than doubled between 1990 and 2003, increasing from some 60 units to about 160 units.<sup>5</sup> There are about 225 cogeneration plants in the country.<sup>6</sup>

The number of electric plants using coal as a fuel source remained essentially the same despite a 30% increase in coal consumption for transformation into electricity. Canada's coal consumption is primarily for transformation into electricity, using coal that comes mainly from Canadian sources, such as mines in British Columbia, Alberta, Saskatchewan and Nova Scotia.

The energy profile is not necessarily the same across the country. The distinct qualities of the provinces in terms of economy, weather, geography, geology and energy sources determine the quantity of energy consumption.

For example, per capita consumption in some provinces, such as Alberta (0.85 terajoule) and Saskatchewan (0.63 terajoule) is much higher than the national average of 0.33 terajoule per person. Both these provinces are large producers of energy based on non-renewable resources.

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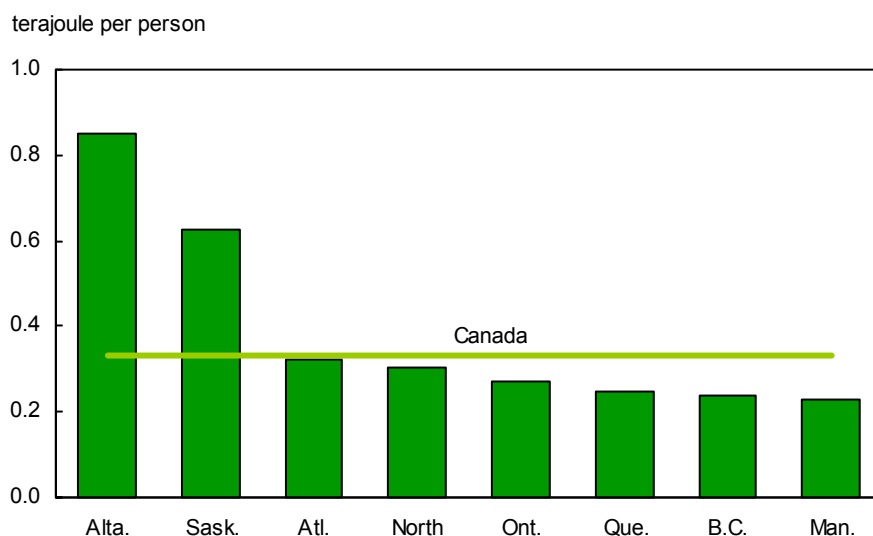
3. Bob van der Zwaan, "Le réchauffement de la planète: la nécessité d'une "décarbonisation" de l'énergie," *Politique étrangère*, 66<sup>th</sup> year, No. 2, April-June 2001, pages 419 to 432.

4. Government of Canada, *Canada and the Kyoto Protocol*, [www.climatechange.gc.ca](http://www.climatechange.gc.ca) (accessed on December 3, 2004).

5. Statistics Canada, *Energy Statistics Handbook*, Statistics Canada Catalogue No. 57-206, 1990 and 2003.

6. COGEN Canada, *Number of cogeneration plant in each province*, special tabulation received February 21, 2005.

## Per capita consumption of energy, Canada and regions, 2003



**Sources:** Report on energy supply-demand in Canada, *Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003*; population estimates, *CANSIM Table 051-0001*.

## Primary energy consumption and selected indicators, Canada, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	3,484,034	4,146,394	662,360	19	41	40	34
Motor gasoline	1,176,539	1,408,057	231,518	20	14	13	12
Diesel fuel	665,305	918,189	252,884	38	8	9	13
Heavy fuel oil	442,474	409,957	-32,517	-7	5	4	-2
Transformed into electricity	141,419	134,019	-7,400	-5	2	1	0
Other products	1,225,672	1,426,165	200,493	16	14	14	10
Natural gas	2,624,093	3,574,810	950,717	36	31	34	49
Transformed into electricity	79,998	337,441	257,443	322	1	3	13
Coal	1,136,170	1,322,644	186,474	16	13	13	10
Transformed into electricity	874,528	1,138,645	264,117	30	10	11	14
Primary electricity	1,304,627	1,433,359	128,732	10	15	14	7
<b>Total<sup>1</sup></b>	<b>8,548,924</b>	<b>10,477,207</b>	<b>1,928,283</b>	<b>23</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	27,697,530	31,629,677	3,932,147	14			
Per capita energy consumption (terajoule per person)	0.30865	0.33125	0.02259	7			
Real GDP (millions of 1997 \$)	765,311	1,096,359	331,048	43			
Consumption of energy per real GDP \$ (megajoules per \$)	11.17	9.56	-1.61	-14			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** Report on energy supply-demand in Canada, *Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003*; population estimates, *CANSIM Table 051-0001*; Real GDP, *CANSIM Table 384-0013*.

## Atlantic Provinces: A rapidly changing energy profile

An increase in petroleum and natural gas extraction in the Atlantic Provinces has made a big contribution to a change in the energy profile of this region.

Natural gas consumption has soared following development of the Sable Island natural gas fields off the coast of Nova Scotia. Natural gas consumption in the region, which was virtually nil in 1990, represented 8% of energy consumption in the Atlantic Provinces in 2003. This increase is even more phenomenal since natural gas from the region only came onto the domestic market in 2000.

The industrial sector quickly adopted this new energy source which releases less greenhouse gas than other fossil fuels.<sup>7</sup> Natural gas largely replaced heavy fuel oil for which consumption fell by 23%. Its share of energy consumption dropped from 30% in 1990 to 20% in 2003.

Of the 15 generating stations in the Atlantic Provinces using heavy fuel oil to produce electricity in 1990, only about 4 still remained in 2003.<sup>8</sup> The others were converted to natural gas. This substitution accounts for a quarter of the drop in heavy fuel oil consumption and nearly a fifth of the increase in natural gas consumption.

The industrial, transportation and the mining, petroleum and gas extraction sectors also abandoned heavy fuel oil in favour of natural gas.

Total energy consumption in the Atlantic Provinces rose by 16% between 1990 and 2003 despite a slight 1% drop in population during the same period. Per capita consumption increased by 17%.

The Atlantic Provinces are heavily dependent on refined petroleum products. In 2003, refined petroleum products held a 69% share of the consumption market, well above the national average of 40%. This dependence was lessened between 1990 and 2003 while other energy sources such as natural gas and coal increased their share of consumption.

Since 1990, overall coal consumption has increased by 40% in the Atlantic Provinces and has contributed to one-third of total energy consumption in those provinces. The additional coal consumed since 1990 has been transformed into electricity. Nearly all the coal consumed in the Atlantic Provinces is transformed into electricity.

Coal consumed in the Atlantic Provinces is derived from domestic and imported production. Domestic coal came primarily from mines in Cape Breton Island which ceased production in 2003.

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7. Environment Canada, *Information on Greenhouse Gas Sources and Sinks*, [www.ec.gc.ca/pdb/ghg/factsheet5\\_e.cfm](http://www.ec.gc.ca/pdb/ghg/factsheet5_e.cfm) (accessed on December 1, 2004).

8. Statistics Canada, *Electric Energy Statistics*, Statistics Canada catalogue No. 57-206, 1990 and 2003.

**Primary energy consumption and selected indicators, Atlantic provinces, 1990 and 2003**

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	509,736	523,418	13,682	3	78	69	13
Motor gasoline	100,541	109,984	9,443	9	15	15	9
Diesel fuel	71,666	93,803	22,137	31	11	12	21
Heavy fuel oil	192,673	148,318	-44,355	-23	30	20	-43
<i>Transformed into electricity</i>	<i>108,604</i>	<i>98,387</i>	<i>-10,217</i>	<i>-9</i>	<i>17</i>	<i>13</i>	<i>-10</i>
Other products	149,499	173,167	23,668	16	23	23	23
Natural gas	0	57,526	57,526	...	0	8	56
<i>Transformed into electricity</i>	<i>0</i>	<i>16,428</i>	<i>16,428</i>	<i>...</i>	<i>0</i>	<i>2</i>	<i>16</i>
Coal	83,206	116,745	33,539	40	13	15	32
<i>Transformed into electricity</i>	<i>75,822</i>	<i>113,093</i>	<i>37,271</i>	<i>49</i>	<i>12</i>	<i>15</i>	<i>36</i>
Primary electricity	57,612	56,139	-1,473	-3	9	7	-1
<b>Total<sup>1</sup></b>	<b>650,554</b>	<b>753,828</b>	<b>103,274</b>	<b>16</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	2,358,333	2,343,970	-14,363	-1			
Per capita energy consumption (terajoule per person)	0.27585	0.32160	0.04575	17			
Real GDP (millions of 1997 \$)	46,326	64,693	18,367	40			
Consumption of energy per real GDP \$ (megajoules per \$)	14.04	11.65	-2.39	-17			

... not applicable

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.



## Quebec: The hydroelectric province

Quebec is unique in its consumption of hydroelectric power. Primary electric energy's share, essentially hydroelectricity, was 39% in 2003, compared with only 14% for the whole of Canada.

Moreover, consumption of primary electric energy has increased in Quebec in contrast to most other regions of the country. In fact, without Quebec's contribution, total consumption of primary electricity in Canada would have declined. Quebec recorded an increase of 158 petajoules (+28%) while the increase for the whole of Canada was 129 petajoules (+10%).

As a result of this increase, primary electricity's share of energy consumption rose from 37% to 39% between 1990 and 2003. This slight increase equalled a decrease of two percentage points in natural gas consumption during the same period. This energy substitution is due in part to an increase in natural gas prices since 1999 while the price of electricity has remained stable until 2004.<sup>9</sup> Electricity rates in Quebec, like those in Manitoba, are the lowest in Canada.<sup>10,11</sup>

Since the industrial sector benefits from a lower rate than residential customers,<sup>12</sup> it is not surprising that most of the electricity consumed in Quebec is used by industry. This sector is the biggest consumer of electricity and the pulp and paper, iron and steel, smelting and refining, cement plants and chemical product industries are the biggest energy consumers in the sector.

Smelting and refining industries alone account for half of the electricity used by the industrial sector. For example, the Alouette aluminium plant, which will begin operation in 2005 at Sept-Îles in the Côte Nord region will consume 12,240 terajoules per year.<sup>13</sup> In comparison, Hydro-Québec plans to open a generating station in the same year on the Toulouste River in the same region of Quebec that will produce an average of 9,360 terajoules per year.<sup>14</sup>

The residential sector is the second largest consumer of primary electricity. An increase in the number of housing units under construction and completed in 2002 and in 2003<sup>15</sup> led to an increase in the amount of electricity used for lighting and heating.

The increase in primary electric energy accounts for half of the 20% rise in total energy consumption in the province. Quebec's population growth (+7%) is not high enough to account for all of the increase in total energy consumption.

In fact, the industrial and transportation sectors are mainly responsible for increased energy consumption in the province. The major energy-consuming industries account for the industrial

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9. Statistics Canada, Consumer price index, CANSIM Table 326-0002.

10. Charles A. Carrier, *Hausse des tarifs d'électricité au Québec: éléments problématique*, Document CPP 2004-01, Association des économistes du Québec, [www.asdeq.org](http://www.asdeq.org) (accessed on February 8, 2005).

11. Ressources naturelles, faune et parc Québec, *L'énergie au Québec*, [www.mrn.gouv.qc.ca/english/energy/overview/overview-consumption.jsp](http://www.mrn.gouv.qc.ca/english/energy/overview/overview-consumption.jsp) (accessed on February 8, 2005).

12. Paul Daniel Muller, "Les prix de l'électricité," *Le point de l'Institut économique de Montréal*, November 18, 2004, [www.iedm.org](http://www.iedm.org) (accessed on February 8, 2005).

13. Ibid.

14. Hydro-Québec, *Sustainability Report 2003*, [www.hydroquebec.com/publications/en/enviro\\_performance/2003/index.html](http://www.hydroquebec.com/publications/en/enviro_performance/2003/index.html) (accessed on February 11, 2005).

15. Statistics Canada, Housing starts, CANSIM Table 027-0009.

sector's higher energy consumption. These include pulp and paper, iron and steel, smelting and refining industries, cement plants, and chemical products.<sup>16,17</sup>

Refined petroleum products represent slightly less than half of energy consumption both in 1990 and in 2003 despite a 20% increase in consumption over the 13 years. This increase accounts for nearly half the growth in total energy consumption since 1990. Consumption of all refined petroleum products rose because of increased consumption in the transportation sector.

### Primary energy consumption and selected indicators, Quebec, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	731,621	879,180	147,559	20	48	48	48
Motor gasoline	252,354	300,019	47,665	19	16	16	16
Diesel fuel	115,386	147,514	32,128	28	8	8	10
Heavy fuel oil	107,843	146,624	38,781	36	7	8	13
<i>Transformed into electricity</i>	<i>16,786</i>	<i>19,938</i>	<i>3,152</i>	<i>19</i>	<i>1</i>	<i>1</i>	<i>1</i>
Other products	264,571	292,631	28,060	11	17	16	9
Natural gas	211,524	220,931	9,407	4	14	12	3
<i>Transformed into electricity</i>	<i>1,485</i>	<i>1,466</i>	<i>-19</i>	<i>-1</i>	<i>0</i>	<i>0</i>	<i>0</i>
Coal	27,450	19,130	-8,320	-30	2	1	-3
<i>Transformed into electricity</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Primary electricity	560,885	718,847	157,962	28	37	39	52
<b>Total<sup>1</sup></b>	<b>1,531,480</b>	<b>1,838,088</b>	<b>306,608</b>	<b>20</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	7,003,876	7,487,169	483,293	7			
Per capita energy consumption (terajoule per person)	0.21866	0.24550	0.02684	12			
Real GDP (millions of 1997 \$)	170,851	230,983	60,132	35			
Consumption of energy per real GDP \$ (megajoules per \$)	8.96	7.96	-1.01	-11			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

16. Ressources naturelles, Faune et parc Québec, *L'énergie au Québec*, [www.mrn.gouv.qc.ca/english/energy/overview/overview-consumption.jsp](http://www.mrn.gouv.qc.ca/english/energy/overview/overview-consumption.jsp) (accessed on February 8, 2005).

17. Statistics Canada, *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 2003.

## Ontario: Increased consumption linked to population growth

Ontario, Canada's biggest energy consumer, increased its total energy consumption between 1990 and 2003. Unlike other provinces, Ontario's growing population has fuelled higher energy demand along with industrial consumption.

Despite a 17% upswing in total energy consumption in Ontario, per capita consumption actually declined slightly. This was the result of a higher rate of growth in its population than the increase in energy consumption.

The number of housing units built in recent years has continued to rise.<sup>18</sup> However, the greater energy efficiency in building stock has tempered the impact of population increase on energy consumption.<sup>19</sup> This is a result of improved building standards, sponsored energy efficiency and renovation programs, and installation of high efficiency furnaces.

Some twenty years ago, Natural Resources Canada and the residential construction industry developed the R-2000 Initiative.<sup>20</sup> This cross-Canada initiative has led to construction based on new standards that improve home insulation and heating. Heating is improved with the substitution of oil by natural gas in Ontario. According to the Office of Energy Efficiency, homes built to the R-2000 standard consume about 30% less energy than homes built by traditional methods.<sup>21</sup>

In the industrial sector, companies have moved to more efficient energy technology by installing new high efficiency furnaces. With the help of the Canadian Industry Program for Energy Conservation (CIPEC), industries can take advantage of incentives that help reduce energy consumption. The program was introduced by Natural Resources Canada some thirty years ago to promote industrial awareness of improved energy practices.<sup>22</sup> According to the Office of Energy Efficiency, the total consumption of energy saved, in 2001, by the CIPEC industries is almost equal to the consumer energy demand of the Atlantic Provinces.<sup>23</sup>

Refined petroleum products are the energy source most in demand in the province of Ontario. The use of natural gas also increased between 1990 and 2003, as well as natural gas transformation to produce electricity at the expense of primary electricity.

Ontario's dependence on refined petroleum products is on a par with the national average. The use of refined petroleum products remained stable at 39% of total energy use despite an increase of almost 20% in total consumption of these products.

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18. Statistics Canada, Housing starts, CANSIM Table 027-0009.

19. Environment Canada, *Information on Greenhouse Gas sources and sinks*, [www.ec.gc.ca/pdb/ghg/factsheet5\\_e.cfm](http://www.ec.gc.ca/pdb/ghg/factsheet5_e.cfm) (accessed on December 1, 2004).

20. Office of Energy Efficiency, *R-2000: every home should be this good*, [www.oeenrncan.gc.ca/r-2000/english/public/index.cfm](http://www.oeenrncan.gc.ca/r-2000/english/public/index.cfm) (accessed on February 11, 2005).

21. Ibid.

22. Jessica Norup, *CIPEC: Improving Industrial Energy Efficiency in Canada*, Federal-provincial-territorial committee on energy statistics, January 26, 2005.

23. Canadian Industry Program for Energy Conservation, *Success: A Canadian Industry Program for Energy Conservation 2001/2002 Annual Report*, Natural Resources Canada, 2003, 89 pages.

Motor gasoline consumption increased by a quarter between 1990 and 2003. The growing number of vehicles on Ontario highways,<sup>24</sup> the increased power of automobile engines and the growing popularity of sports utility vehicles are all factors that affected motor gasoline consumption.<sup>25,26</sup> Gasoline sales in Ontario rose from more than 12 billion litres to more than 15 billion litres between 1990 and 2003.

Diesel fuel has the biggest increase of all of the refined petroleum products, its consumption having doubled between 1990 and 2003. Sales of diesel fuel in Ontario increased gradually during the same period, rising from more than 2 billion to almost 5 billion litres.<sup>27</sup>

Consumption of heavy fuel oil dropped by 38% during the study period, a drop in favour of natural gas as the industrial sector switched fuel types for steam and electricity production.

Drawn by more attractive prices for natural gas and the incitement to reduce greenhouse gas emissions, the industrial sector abandoned heavy fuel oil in favour of natural gas as fuel for their industrial processes and for production of steam and electricity by cogeneration. There are about 90 cogeneration plants in Ontario.<sup>28</sup>

The use of natural gas increased considerably in Ontario between 1990 and 2003, a gain of five percentage points of total consumption in the province. The 35% surge in use of this energy source results mainly from the use of natural gas for transformation into electricity, which rose from 0% to 4% of total energy consumption.

Overall, use of natural gas contributed to 60% of the increase in total energy consumption in the province.

Primary electricity's share of energy consumption in Ontario declined by four percentage points. The power outage that affected Ontario and eight American states in 2003 has appreciably reduced the consumption of primary electricity of that year, emphasizing the decline.<sup>29</sup>

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24. Statistics Canada, *Canadian Vehicle Survey, Annual*, Statistics Canada Catalogue No. 53-223-XIE, 2000 to 2003.

25. Ibid.

26. Erik Magnusson, "Sport Utility Vehicles: Driving Change," *Analysis in brief*, Statistics Canada Catalogue No. 11-621-MIF2005020, February 2005.

27. Statistics Canada, Road motor vehicles, fuel sales, CANSIM Table 405-0002.

28. COGEN Canada, *Number of cogeneration plant in each province*, special tabulation received February 21, 2005.

29. Statistics Canada, *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 2003.

## Primary energy consumption and selected indicators, Ontario, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	1,084,058	1,291,027	206,969	19	39	39	43
Motor gasoline	432,446	539,230	106,784	25	15	16	22
Diesel fuel	169,466	248,437	78,971	47	6	8	16
Heavy fuel oil	89,361	55,385	-33,976	-38	3	2	-7
<i>Transformed into electricity</i>	13,415	14,880	1,465	11	0	0	0
Other products	397,142	450,521	53,379	13	14	14	11
Natural gas	825,513	1,112,288	286,775	35	29	34	60
<i>Transformed into electricity</i>	10,487	131,630	121,143	1,155	0	4	25
Coal	492,623	515,103	22,480	5	18	16	5
<i>Transformed into electricity</i>	286,067	381,948	95,881	34	10	12	20
Primary electricity	408,404	373,293	-35,111	-9	15	11	-7
<b>Total<sup>1</sup></b>	<b>2,810,598</b>	<b>3,291,711</b>	<b>481,113</b>	<b>17</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	10,297,875	12,238,300	1,940,425	19			
Per capita energy consumption (terajoule per person)	0.27293	0.26897	-0.00396	-1			
Real GDP (millions of 1997 \$)	316,929	459,805	142,876	45			
Consumption of energy per real GDP \$ (megajoules per \$)	8.87	7.16	-1.71	-19			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

## Manitoba: A decrease in per capita energy consumption

Between 1990 and 2003, total energy consumption in Manitoba rose slightly (+3%) and more slowly than the increase in population (+5%), which resulted in a drop in per capita energy consumption of 2%.

Primary energy, mainly hydroelectricity, accounts for the greatest part of the increase in total energy consumption in Manitoba. Electricity use rose by 8% between 1990 and 2003. This small advance represented more than 60% of the total energy consumption increase in the province.

Primary electricity represents a quarter of Manitoba's energy profile. Hydroelectric generating stations are the main producers of primary electricity in the province. The cost of primary electricity in Manitoba is among the lowest in Canada. For industrial customers, government policy has resulted in no increase in the price of electricity for about a dozen years.<sup>30</sup> For residential customers, the consumer price index for domestic use of electricity remained fairly stable between 1997 and 2003 while the price of natural gas, in comparison, increased by about 90% during the same period.<sup>31</sup>

Refined petroleum products were most in demand in the province with a 38% share of energy consumption in 2003, slightly less than the national average of 40%. Consumption of refined petroleum products marginally increased between 1990 and 2003. Motor gasoline consumption rose slightly between 1990 and 2003 while use of diesel showed a mild decline during the same period.

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30. Province of Manitoba, *Industry sector summaries – Electricity and natural gas*, [www.gov.mb.ca/itm/profiles/electric](http://www.gov.mb.ca/itm/profiles/electric) (accessed on December 12, 2004).

31. Statistics Canada, Consumer Price Index, CANSIM Table 326-0002.

### Primary energy consumption and selected indicators, Manitoba, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	99,966	101,878	1,912	2	39	38	23
Motor gasoline	47,866	50,968	3,102	6	19	19	37
Diesel fuel	34,149	33,897	-252	-1	13	13	-3
Heavy fuel oil	3,292	2,837	-455	-14	1	1	-5
<i>Transformed into electricity</i>	123	124	1	1	0	0	0
Other products	15,897	14,539	-1,358	-9	6	5	-16
Natural gas	90,034	91,157	1,123	1	35	34	13
<i>Transformed into electricity</i>	59	1,507	1,448	2,454	0	1	17
Coal	7,135	7,384	249	3	3	3	3
<i>Transformed into electricity</i>	4,464	6,616	2,152	48	2	2	25
Primary electricity	61,581	66,775	5,194	8	24	25	61
<b>Total<sup>1</sup></b>	<b>258,716</b>	<b>267,194</b>	<b>8,478</b>	<b>3</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	1,105,668	1,162,776	57,108	5			
Per capita energy consumption (terajoule per person)	0.23399	0.22979	-0.00420	-2			
Real GDP (millions of 1997 \$)	27,254	34,368	7,114	26			
Consumption of energy per real GDP \$ (megajoules per \$)	9.49	7.77	-1.72	-18			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

## Saskatchewan: A large increase in natural gas consumption

Between 1990 and 2003, Saskatchewan consumed a great deal more energy (+34%) while its population remained relatively stable, producing the most important increase in per capita consumption among the regions studied.

Growth of the petroleum and natural gas sector in recent years contributed to the surge in consumption. The same situation occurred in other provinces, such as Saskatchewan's neighbour province, Alberta.

One of the factors that influenced energy consumption is the growing use of energy by oil upgrading plants, where crude oil is lightened to produce synthetic crude oil. For instance, the opening of a new Husky upgrading plant in 1992 contributed to increased demand for electricity and natural gas.

Another factor was the development of new cogeneration stations fuelled by natural gas. The cogeneration stations use the same machinery to produce steam and electricity. There are about ten such cogeneration stations in Saskatchewan.<sup>32</sup>

Thus, it is not surprising that use of natural gas surged dramatically between 1990 and 2003, accounting for more than 70% of the increase in total energy consumption in the province. The quantity of natural gas consumed made a spectacular 60% leap in 13 years, rising from a 40% share of the province's energy profile in 1990 to 48% in 2003.

In 1990, natural gas was only marginally used for production of electricity. Thirteen years later, that use has greatly increased at the expense of primary electricity which has declined.

New cogeneration stations, such as the Meridian station at Lloydminster, are producing electricity for Saskatchewan. The Meridian station produces electricity for SaskPower, the crown corporation that is responsible for electricity. The station also produces steam that is used by the Husky heavy oil upgrading plant. The station produces enough electricity to supply a city the size of Saskatoon.<sup>33</sup>

In addition, the potassium industry and the gas and oil industries use large quantities of natural gas to produce the electricity required in their industrial production processes.

Saskatchewan's dependence on refined petroleum products is less than the national average. Despite a slight increase in consumption of refined petroleum products during the study period, the consumption share dropped from 32% in 1990 to 27% in 2003, a decrease of five percentage points. This drop was matched by an increase in natural gas consumption.

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32. COGEN Canada, *Number of cogeneration plants in each province*, special tabulation received February 21, 2005.

33. Transalta, *Meridian Cogeneration Plant*, [www.transalta.com](http://www.transalta.com) (accessed on February 16, 2005).



Motor gasoline consumption increased only slightly between 1990 and 2003 while use of diesel fuel rose by a quarter. Diesel fuel is widely used by oil and gas exploration companies in drilling wells and extracting the resource. In 2003, about 2,300 natural gas wells were drilled in the province, a trend that has been increasing in recent years.<sup>34</sup>

Despite higher coal consumption in Saskatchewan between 1990 and 2003, coal's share in the province's energy profile dropped by two percentage points. Coal consumption is nearly all transformed into electricity (97%), both in 1990 and in 2003. All coal used comes from Saskatchewan.

### Primary energy consumption and selected indicators, Saskatchewan, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	148,168	168,730	20,562	14	32	27	13
Motor gasoline	56,696	61,593	4,897	9	12	10	3
Diesel fuel	46,904	58,696	11,792	25	10	9	7
Heavy fuel oil	1,167	8,079	6,912	592	0	1	4
<i>Transformed into electricity</i>	206	8	-198	-96	0	0	0
Other products	45,304	40,902	-4,402	-10	10	7	-3
Natural gas	186,259	298,390	112,131	60	40	48	71
<i>Transformed into electricity</i>	5,136	54,860	49,724	968	1	9	31
Coal	115,736	146,506	30,770	27	25	23	19
<i>Transformed into electricity</i>	111,876	141,769	29,893	27	24	23	19
Primary electricity	15,473	10,841	-4,632	-30	3	2	-3
<b>Total<sup>1</sup></b>	<b>465,636</b>	<b>624,467</b>	<b>158,831</b>	<b>34</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	1,007,114	994,843	-12,271	-1			
Per capita energy consumption (terajoule per person)	0.46235	0.62770	0.16536	36			
Real GDP (millions of 1997 \$)	24,945	32,000	7,055	28			
Consumption of energy per real GDP \$ (megajoules per \$)	18.67	19.51	0.85	5			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

34. Province of Saskatchewan, *News—SaskEnergy posts strong financial year*, [www.wideopenfuture.ca/news-1004-04-20a.html](http://www.wideopenfuture.ca/news-1004-04-20a.html) (accessed on February 11, 2005).

## Alberta: the biggest per capita consumer of energy

Alberta is Canada's biggest per capita consumer of energy. In 2003, Alberta's per capita consumption was two-and-a-half times higher than the national average. Between 1990 and 2003, per capita energy consumption increased by 11%. That surge was not entirely due to a sizeable increase in population. A big part of the increase in total energy consumption resulted from industrial activity in the province.

From 1990 to 2003, Alberta had the strongest economic growth of any region in the country—57% compared to 43% for all of Canada. Its flourishing economy is the result of a booming oil and gas sector. For instance, about 160,000 cubic metres of crude oil is extracted each day from oil sand production.<sup>35</sup>

Canada's leading oil producer, Alberta ranks first in the country in terms of established oil reserves with an estimated 1.4 billion cubic metres, largely because of an unconventional oil resource, its bituminous oil sands.<sup>36</sup>

Natural gas is a heavily used energy source in Alberta, comprising more than half of the energy consumption in the province. The rise in natural gas use between 1990 and 2003 represented almost 60% of the increase in total energy consumption in Alberta.

In addition to residential consumption, natural gas is widely used to generate steam for the underground extraction of bitumen contained in Alberta's oil sands. Steam is injected into the ground to heat the deposits and separate the bitumen which is then carried to refining plants.<sup>37</sup> It is estimated that to exploit the oil sands, it requires, each year, the use of a quantity of natural gas equivalent to total natural gas consumption in the province of Quebec.<sup>38</sup>

Natural gas is also used to produce the electricity that moves the giant shovels used in extracting oil sands in open mine operations. Transformation of natural gas into electricity has more than doubled since 1990. The number of electric generating stations using natural gas as a fuel also doubled between 1990 and 2003, rising from some 30 to about 60.<sup>39</sup> While the share in energy consumption of natural gas transformed into electricity increased by two percentage points, the use of coal for the same purpose fell by the same amount.

The consumption of refined petroleum products has increased since 1990 but their market share has remained the same, representing slightly more than a quarter of total energy consumption. Compared to the national average, Albertans use a great deal less of refined petroleum products. The difference amounts to 13 percentage points.

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35. Canadian Association of Petroleum Producers, *Crude oil*, brochure 2004, [www.capp.ca](http://www.capp.ca) (accessed on February 11, 2005).

36. Statistics Canada, *Oil and Gas Extraction 2000*, Statistics Canada Catalogue No. 26-213-XPB, page 7.

37. Government of Alberta, *Introduction to oil sands*, [www.energy.gov.ab.ca](http://www.energy.gov.ab.ca) (accessed on December 12, 2004).

38. William Bingham, *Natural gas markets in transition: The crucial importance of reliable energy statistics*, Federal-provincial-territorial committee on energy statistics, January 26, 2005.

39. Statistics Canada, *Electric Energy Statistics*, Statistics Canada Catalogue No. 57-206, 1990 and 2003.

Motor gasoline and diesel fuel are the two refined petroleum products most widely used in the province. Since 1990, motor gasoline's share of energy consumption has fallen by one percentage point, ground lost to diesel fuel which has shown a consumption increase of 62% in the past 13 years. Diesel fuel is also used in conventional production of oil (from oil wells) and in oil sands development, especially as a fuel for the fleet of mammoth trucks carrying up to 400 tonnes of oil sands material to treatment plants.<sup>40</sup>

While coal is not the most popular energy source in Alberta, it continues to play an important role in the province. Coal consumption increased by 25% since 1990 but its share of total energy consumption declined slightly. Nearly all the coal is used for transformation into electricity to supply homes and businesses in the province.

### Primary energy consumption and selected indicators, Alberta, 1990 and 2003

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	516,405	727,698	211,293	41	27	27	29
Motor gasoline	159,554	181,583	22,029	14	8	7	3
Diesel fuel	122,508	198,660	76,152	62	6	7	10
Heavy fuel oil	685	2,455	1,770	258	0	0	0
<i>Transformed into electricity</i>	0	176	176	...	0	0	0
Other products	234,598	345,791	111,193	47	12	13	15
Natural gas	1,024,186	1,442,035	417,849	41	53	54	57
<i>Transformed into electricity</i>	45,273	104,942	59,669	132	2	4	8
Coal	402,860	499,195	96,335	24	21	19	13
<i>Transformed into electricity</i>	396,300	495,220	98,920	25	20	18	14
Primary electricity	4,536	9,734	5,198	115	0	0	1
<b>Total<sup>1</sup></b>	<b>1,947,987</b>	<b>2,678,662</b>	<b>730,675</b>	<b>38</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	2,547,166	3,153,723	606,557	24			
Per capita energy consumption (terajoule per person)	0.76477	0.84937	0.08460	11			
Real GDP (millions of 1997 \$)	82,518	129,553	47,035	57			
Consumption of energy per real GDP \$ (megajoules per \$)	23.61	20.68	-2.93	-12			

... not applicable

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

40. Syncrude Canada, *Aurora project*, [www.syncrude.com](http://www.syncrude.com) (accessed on December 12, 2004).

## British Columbia: A decrease in per capita energy consumption

Between 1990 and 2003, per capita consumption in British Columbia fell by 8% because population growth (+26%) outstripped the increase in energy consumption in the province (+16%).

Milder weather over the past years<sup>41</sup> and the construction of more energy efficient houses are factors in the drop in per capita energy consumption. In addition, rationalization and restructuring of major energy consuming industries such as pulp and paper and coal helped moderate the rise in energy consumption in the province.

Refined petroleum products are the main energy type used in British Columbia. In 1990 and in 2003, the market share of energy consumption of these products in the province remained stable at 44%. However, that does not mean that consumption remained stable. On the contrary, use of these products rose by 16% between 1990 and 2003. Along with an increase in natural gas use, these two trends accounted for more than 90% of the change in consumption patterns during the study period.

Among refined petroleum products, motor gasoline (+31%) recorded the biggest increase in British Columbia ahead of diesel fuel (+27%). Greater demand from the transportation sector accounted for the expansion in motor gasoline and diesel fuel consumption. The increase in the number of vehicles on the province's highways,<sup>42</sup> including the growing popularity of sport utility vehicles,<sup>43,44</sup> has been driven by the growth in population. Sales of gasoline and diesel fuel rose every year in British Columbia between 1990 and 2003.<sup>45</sup> Increased use of diesel fuel by industry also contributed to the rise in consumption.

Natural gas consumption represented 35% of energy use in British Columbia in 2003, a jump of two percentage points in market share over 13 years. From 1990 to 2003, natural gas consumption rose by 23%, with significant increases in the residential, commercial and institutional sectors along with the public administration sector.

The use of natural gas to produce electricity doubled between 1990 and 2003, increasing its share of energy consumption at the expense of primary electricity which lost ground during the same period.

Despite more than a two-fold increase in coal consumption in British Columbia, its contribution to the growth of energy consumption in the province is less than 10%. Coal used in British Columbia is not transformed into electricity but is used for industrial purposes such as manufacturing of cement.

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41. Environment Canada, *Degree-Days by Provinces and Territories*, special tabulation, 1990 to 2003.

42. Statistics Canada, *Canadian Vehicle Survey, Annual*, Statistics Canada Catalogue No. 53-223-XIE, 2000 to 2003.

43. Ibid.

44. Erik Magnusson, "Sport Utility Vehicles: Driving Change," *Analysis in brief*, Statistics Canada Catalogue No. 11-621-MIF2005020, February 2005.

45. Statistics Canada, Road motor vehicles, fuel sales, CANSIM Table 405-0002.

**Primary energy consumption and selected indicators, British Columbia, 1990 and 2003**

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	371,476	432,370	60,894	16	44	44	44
Motor gasoline	123,649	161,609	37,960	31	14	16	27
Diesel fuel	98,650	125,694	27,044	27	12	13	20
Heavy fuel oil	47,370	46,259	-1,111	-2	6	5	-1
<i>Transformed into electricity</i>	2,284	504	-1,780	-78	0	0	-1
Other products	103,713	99,583	-4,130	-4	12	10	-3
Natural gas	281,436	345,560	64,124	23	33	35	46
<i>Transformed into electricity</i>	16,588	24,958	8,370	50	2	3	6
Coal	7,161	18,581	11,420	159	1	2	8
<i>Transformed into electricity</i>	0	0	0	0	0	0	0
Primary electricity	193,710	195,729	2,019	1	23	20	1
<b>Total<sup>1</sup></b>	<b>853,783</b>	<b>992,240</b>	<b>138,457</b>	<b>16</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	3,290,814	4,146,580	855,766	26			
Per capita energy consumption (terajoule per person)	0.25944	0.23929	-0.02015	-8			
Real GDP (millions of 1997 \$)	95,722	133,600	37,878	40			
Consumption of energy per real GDP \$ (megajoules per \$)	8.92	7.43	-1.49	-17			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.

## Northern Region: The biggest drop in per capita energy consumption

The Northern Region<sup>46</sup> recorded the biggest drop in per capita energy consumption among all the regions surveyed in this study.

The Northern Region consumed almost the same quantity of energy in 2003 as they did in 1990. During that 13-year period, population grew by 18% (+16,000 residents) which resulted in a 13% decrease in per capita energy consumption.

With the exception of diesel fuel, use of all refined petroleum products declined during the study period. Diesel fuel's share of consumption rose by seven percentage points between 1990 and 2003, while diesel consumption climbed by 26%. This increased use of diesel stems from the industrial sector, specifically in the mining sector, oil and gas production and the transportation sector.

The mining sector is booming in the North, particularly in the Northwest Territories with the opening in 1991 of two diamond mines, the EKATI mine and the Diavik mine and the coming opening of a third mine, at Snap Lake.<sup>47</sup> The building and development of the diamond mines has led to growth in other industries, including the construction and truck transport sectors. In 2002, truckers delivered about 9,000 loads of material and supplies to the EKATI and Diavik mines.<sup>48</sup>

Between 1990 and 2003, consumption of natural gas rose by 35% to reach a 22% share of energy consumption, an increase of five percentage points compared to 1990. Various economic sectors contributed to this advance, among them were the commercial sector and other institutions as well as the mining, oil and gas sectors.

Two important proposals for construction of pipelines (Alaska Highway Pipeline and Mackenzie Valley Pipeline) to transport natural gas to markets in the south are currently under review in the North. The completion of these projects could change the energy profile of the territories, as it did in the Atlantic provinces.

Use of natural gas for transformation into electricity increased substantially between 1990 and 2003 while market share rose from 1% to 3% during the same period.

Total consumption of primary electricity fell by 17% between 1990 and 2003, with a similar loss of market share. Availability of primary electricity energy declined during the study period as hydroelectricity production also fell due to a drop in water levels.

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46. The Yukon, the Northwest Territories and Nunavut are grouped as the Northern Region.

47. Bruna Santarossa, "Diamonds: Adding lustre to the Canadian economy," *Analysis in brief*, Statistics Canada Catalogue No. 11-621-MIE2004008.

48. *Ibid.*

**Primary energy consumption and selected indicators, Northern Region, 1990 and 2003**

Variable	Level		Variation from 1990 to 2003		% share of energy consumed		% contribution to change
	1990	2003	value	%	1990	2003	
<b>Primary Energy Consumption in terajoules</b>							
Refined petroleum products	22,631	22,089	-542	-2	75	71	-66
Motor gasoline	3,434	3,071	-363	-11	11	10	-44
Diesel fuel	9,086	11,488	2,402	26	30	37	293
Heavy fuel oil	78	0	-78	-100	0	0	-10
<i>Transformed into electricity</i>	0	0	0	0	0	0	0
Other products	12,469	9,028	-3,441	-28	41	29	-420
Natural gas	5,142	6,926	1,784	35	17	22	218
<i>Transformed into electricity</i>	970	1,651	681	70	3	5	83
Coal	0	0	0	0	0	0	0
<i>Transformed into electricity</i>	0	0	0	0	0	0	0
Primary electricity	2,426	2,003	-423	-17	8	6	-52
<b>Total<sup>1</sup></b>	<b>30,199</b>	<b>31,018</b>	<b>819</b>	<b>3</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Selected indicators</b>							
Population (persons)	86,684	102,316	15,632	18			
Per capita energy consumption (terajoule per person)	0.34838	0.30316	-0.04522	-13			
Real GDP (millions of 1997 \$)	3,482	5,658	2,176	62			
Consumption of energy per real GDP \$ (megajoules per \$)	8.67	5.48	-3.19	-37			

1. The total is the sum of the four major components: refined petroleum products, natural gas, coal and primary electricity. These components might not add up to the total due to rounding.

**Sources:** *Report on energy supply-demand in Canada*, Statistics Canada Catalogue No. 57-003-XIB, 1990 and 2003; population estimates, CANSIM Table 051-0001; Real GDP, CANSIM Table 384-0013.