CBEEDAC

CANADIAN
Building Energy End-Use
DATA AND ANALYSIS CENTRE
commercial • residential • institutional

CBEEDAC ENERGY DIGEST

ENERGY CONSUMPTION AND PRICES

2010 Edition

RESIDENTIAL
COMMERCIAL
INDUSTRIAL
TRANSPORTATION

ELECTRICITY
NATURAL GAS
FUEL OILS
RENEWABLES

CANADA
PROVINCES

The Canadian Building Energy End-Use Data and Analysis Centre (CBEEDAC) is a research centre operated at the Department of Economics of the University of Alberta with the support of Natural Resources Canada. The objective of CBEEDAC is to improve and facilitate the dissemination of knowledge on final energy use in the residential, commercial and institutional sectors. Led by a team of renowned energy economics analysts, CBEEDAC carries out research projects of its own initiative and on behalf of third parties. CBEEDAC also collects and archives a wide range of quantitative and qualitative data that constitute an extensive set of resources for research opportunities. The data used in the present publication are part of a dataset assembled over the years by researchers that allows detailed analysis on the main areas of interest of CBEEDAC: energy used in the residential and commercial sectors.

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CBEEDAC ENERGY ECONOMICS DIGEST

ENERGY CONSUMPTION AND PRICES IN CANADA

EDITION OF 2010

Overview

The CBEEDAC Energy Economics Digest presents a detailed and documented analysis of the recent evolution of electricity, natural gas, and fuel oil consumption markets in Canada at both the national and provincial levels. It aims to provide energy sector analysts with up-to-date information on the development of these markets from a historical and quantitative perspective.

In this first edition, the focus is on energy use in Canada in 2008 (the latest year for which data is available) with background information back to 2000, on Alberta's energy markets during the same period, and on provincial differences in the industrial use of electricity. Future annual editions of the CBEEDAC Energy Economics Digest, will provide updated information and will include features on a highlighted province and a theme of interest to industry professionals and both private and public sector energy analysts.

The data that provide the background for this digest form part of a larger dataset on energy use in Canada that has been assembled, and is maintained and updated, by CBEEDAC researchers. Currently, the information contained in this dataset covers four sectors – residential, commercial, industrial, and transportation; institutional data are integrated into the commercial sector and data pertaining to agriculture are generally integrated into the residential sector – 12 geographical entities, and all traditional types of energy consumed in Canada over a period of 50 years. A general description of the CBEEDAC Canadian Energy Use Database content and data sources is included on the last page of this digest.

The CBEEDAC Canadian Energy Use database is updated yearly, and forms an invaluable resource for analytical purposes. The information and analysis presented in this digest is only illustrative of the potential use of this dataset. While the dataset is not available for direct public use, it is used by CBEEDAC researchers in preparing reports and responding to analysis requests. CBEEDAC is always interested in learning of questions or subjects of particular interest to energy sector analysts, and is interested in entering into collaborative relationships with other parties to provide analysis based on these or other data.

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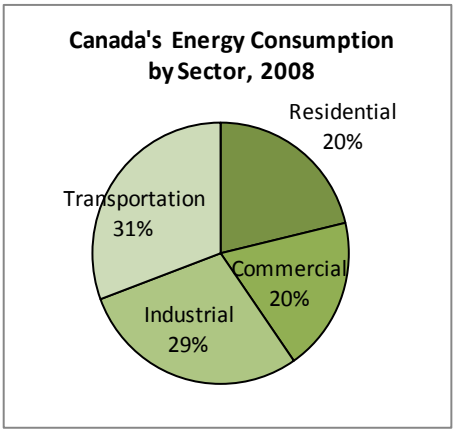
I. Canadian Energy Consumption Fact Sheet

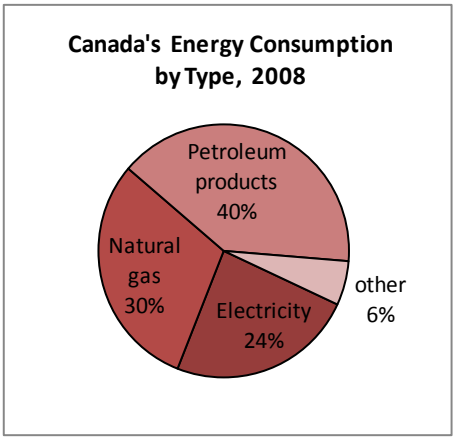
On a per capita basis, Canada is one of the world's largest consumers of energy. Canadian energy needs are fueled primarily by electricity, natural gas, and petroleum products, but small amounts of wood, coal, natural gas liquids, and coke also help to meet final demand. In 2008, final consumption of natural gas, electricity, and other energies was only 5.8% higher than in 2000. Between 2007 and 2008, however, energy consumption in Canada decreased by 1.7%.



➢ In 2008, the transportation sector was the largest consumer of energy (31% of total energy use), followed by the industrial sector at 29% of the total. The residential and commercial sectors each accounted for 20% of the country's final demand for energy.

➢ From 2007 to 2008, energy consumption in the residential and commercial sectors increased by 1.4% and 3%, respectively.

➢ Energy consumed by the industrial and transportation sectors decreased, respectively, by 7% and 1.5% between 2007 and 2008.

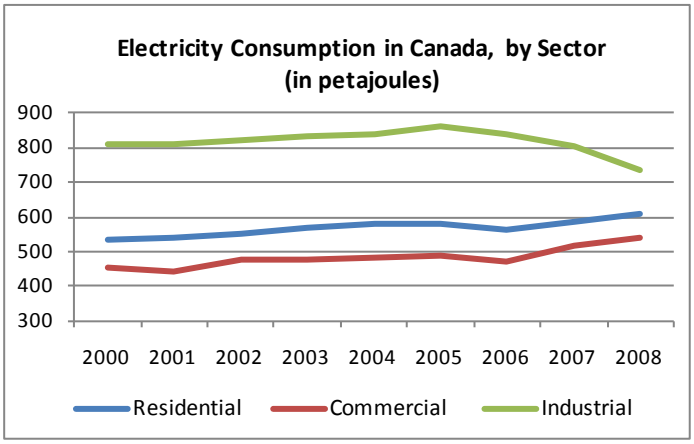


➢ Between 2007 and 2008, combined consumption of all energy types dropped slightly, with the largest decrease (-3.3%) occurring in consumption of natural gas.

➢ Compared to 2000, however, the demand for each energy type has increased. The smallest increase has been in natural gas consumption, where demand is only about 2% higher in 2008 than it was in 2000.

➢ Petroleum products, which represent all available refined oil products (essentially gasoline, heating oil …), have seen the largest increase in consumption between 2000 and 2008: +9.3%.

➢ 71% of end-use consumption of petroleum products in 2008 occurred in the transportation sector.



➢ Overall, Canadians consumed about 5% more electricity in 2008 than in 2000. This evolution is mainly due to developments in the residential (where demand has grown by + 14%) and commercial (+ 20%) sectors.

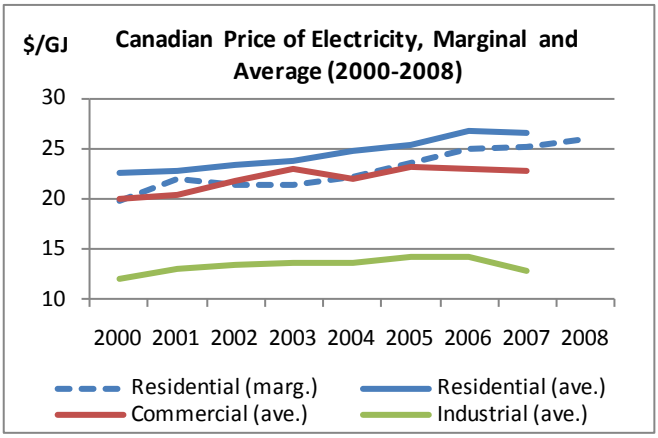
➢ Industrial consumption of electricity decreased by 14.3% between 2005 and 2008, and in 2008 was below its 2000 level. The transportation sector consumes less than 1 % of the country's electricity demand in 2008.

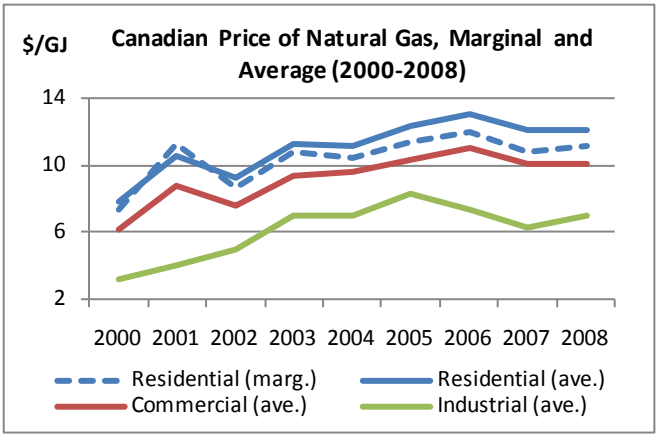
➢ Large inter-provincial variations in the consumption of industrial electricity exist, which are described in further details in section VII.

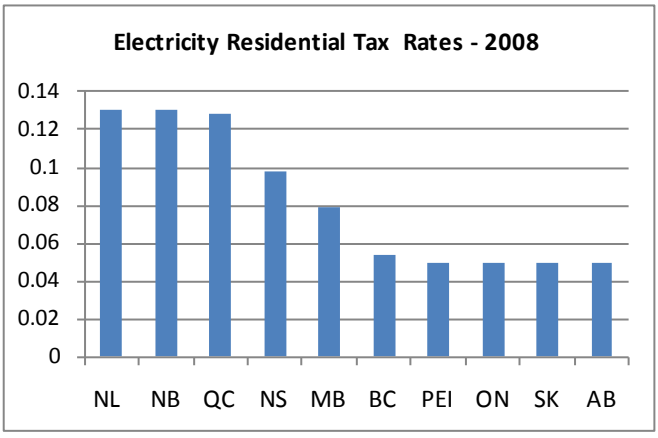
In conjunction with population growth of 9% and GDP growth of 20% in Canada between 2000 and 2008, the observed energy consumption growth of only 5.8% provides evidence of energy efficiency improvements. This downward trend in energy use per capita and per unit of GDP has occurred despite an especially fast increase in electricity use in the commercial sector. After transportation activities, the industrial sector remains the largest consumer of energy, but this sector made a noticeable switch from electricity to natural gas after 2005. In all sectors, the evolution of demand for electricity has been generally smoother over the last few years than has been the demand for natural gas.

II. Canadian Energy Prices Fact Sheet

For all types of energy, nominal market prices in the few years immediately preceding 2008 have been historically high. The annual price series shown here are average and marginal prices compiled first at the provincial level and then averaged for Canada as a whole. Prices include all applicable taxes. Average electricity prices are available only until 2007. Marginal prices comprise those parts of the billed prices that vary with user consumption: the energy demand (or commodity) charge and other variable fees such as those for distribution and transmission, plus applicable taxes.







- In 2007, average residential, commercial and industrial electricity prices were respectively 17%, 14%, and 6% higher than in 2000.

- Between 2006 and 2007, however, average electricity prices stagnated or decreased slightly, depending on the sector.

- The evolution of prices differed across provinces, and smaller provincial consumers tended to experience proportionally smaller price fluctuations over time.

- Between 2007 and 2008, natural gas prices in the residential and commercial sectors were stable and 2008 prices had returned to levels experienced just prior to the 2006 peak.

- Average residential, commercial and industrial natural gas prices increased by 55%, 62%, and 118%, respectively between 2000 and 2008. Most of these price increases occurred in the first half of the decade.

- The industrial sector's average natural gas price (the lowest across all sectors) increased by as much as 20 to 40% annually until 2005. In 2008, the price increased again by 12%.

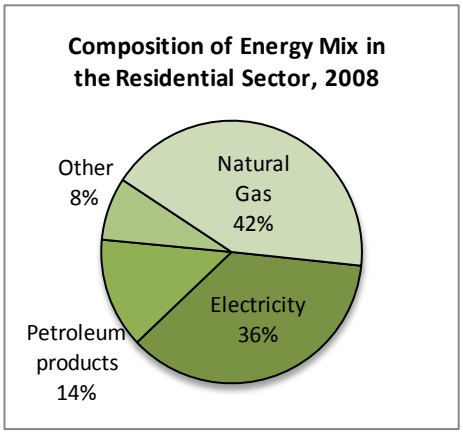
- Prices shown here include all local, provincial and federal taxes and rebates. Most taxes are applied as a percentage of the price, while some are applied on the quantity used, in c/kWh. For purposes of calculation, the latter are transformed into percentage equivalents to obtain the implicit tax rates.

- Quebec and those provinces that have harmonized with the GST (NL, NS, and NB) have the highest tax levels on residential electricity, at around 13%. Only the federal Goods and Services Tax (GST), currently 5%, is applied in Prince Edward Island, Ontario Saskatchewan, and Alberta. Most provincial tax levels were stable between 2000 and 2005, but decreased in 2005 with the reduction in the federal GST rate.

The evolution of natural gas prices has not been as smooth as for electricity prices, although natural gas prices in most provinces appear to fluctuate according to similar patterns. In the case of electricity, interprovincial differences were more marked in the commercial and industrial sectors than in the residential sector. Lower than for electricity but higher than for natural gas, light fuel oil prices have experienced the fastest increase, nearly doubling over the 2000-2008 period. In all provinces and for all fuels, industrial (residential) prices were the lowest (highest).

III. Energy Use in the Canadian Residential Sector

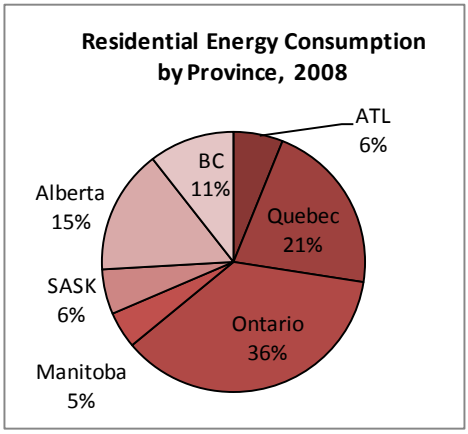
A slow rise in energy demand, 3.8% over the 2000-2008 period, characterized energy consumption in the residential sector, while the population increased by 9% over the same period. Rapid energy price inflation may have contributed to this slow growth in demand. These national figures mask large interprovincial differences, with the preferred type of fuel in each province apparently related to the local ratio of electricity and natural gas prices. Between 2007 and 2008, residential energy demand rose by 1.4%.



- Consumption of natural gas increased by 1% between 2007 and 2008, whereas electricity consumption increased by more than 4%. However, consumption of petroleum products (mostly light fuel oil and kerosene) decreased by 5%.

- The demand for petroleum products experienced a substantial steady decrease between 2000 and 2008 (–23%), while the demand for electricity and for natural gas increased (+14% and +6%, respectively) over the same period.

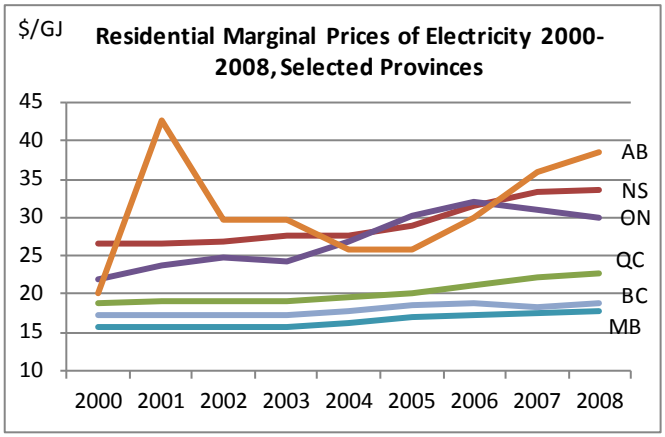
- Wood consumption in 2008 represented 6.3% of Canadian residential energy demand, and was 8.7% higher than in 2000.



- Within Canada, Ontario was the largest consumer of natural gas, accounting for close to half of the residential (and commercial) demand.

- In 2008, Ontario, Quebec and British Columbia combined consumed more than two-thirds of the electricity sold in the Canadian residential sector.

- The locations that experienced the largest increases in electricity demand, each above 25% over the eight-year period from 2000 to 2008, are Manitoba and Alberta.



- With few exceptions, marginal prices for residential electricity increased every year in every province. Most annual changes were less than +10%, and often reached no more than +5%, with the exception of Alberta and Ontario where prices were more volatile.

- In 2008, Alberta households faced the highest marginal electricity prices in Canada, more than twice those in Manitoba and BC, which had the lowest residential prices in 2008.

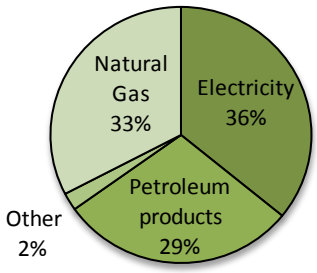
- Explanations to the large spike in Alberta's marginal electricity price in 2001 are detailed in section VI.

The limited overall increase (+3.8%) in residential sector energy demand encompassed large variations in the individual demands for each energy type. The significant reduction in the use of light fuel oil was due to its progressive abandonment by its main consumers: residents of the Atlantic Provinces. As natural gas is increasingly being made available to households in this region, its consumption is expected to rise, although it remains marginal at the moment.

IV. Energy Use in the Canadian Commercial Sector

Between 2000 and 2008, the commercial sector experienced the largest growth in energy consumption (+15%) of all sectors. Between 2007 and 2008, commercial energy demand increased by 3%, while Canada's overall use of energy decreased slightly. The sources of this evolution in commercial sector demand are difficult to identify due to the disparate nature of commercial activities (retail, services, institutions…). This growth in demand has occurred despite rapid price increases that have also been experienced in this sector.

Composition of Energy Mix in the Commercial Sector, 2008

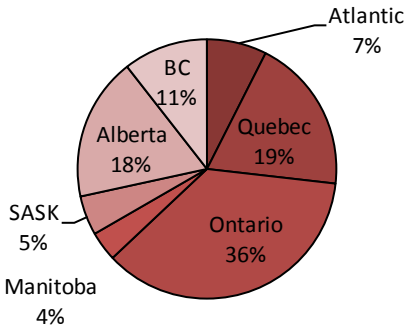


➢ Between 2007 and 2008, commercial consumption of electricity rose by 5% while natural gas consumption increased by 2.8%. The demand for petroleum products increased by less than 1%.

➢ In contrast to the residential sector, commercial demand for petroleum products increased significantly between 2000 and 2008, by 40%. Over the same period, the quantities of natural gas that were consumed decreased by 2%, whereas electricity consumption increased by 20%.

➢ Ontario, Manitoba, and Newfoundland saw their commercial demand for electricity increase by over 25% during the eight-year period, with Prince Edward Island experiencing a rise of 44%.

Commercial Energy Consumption by Province, 2008

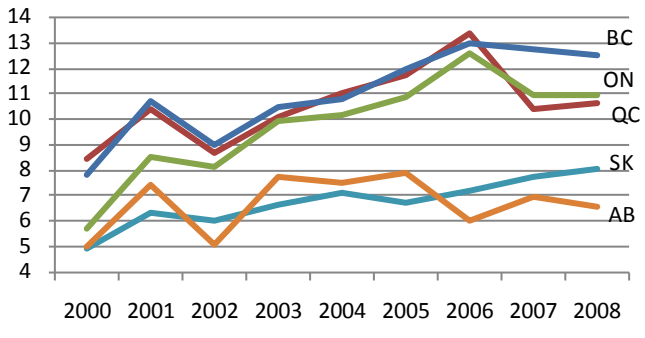


➢ Between 2007 and 2008, commercial energy use increased in all provinces, except the Atlantic Provinces. Manitoba had the second largest consumption increase of all the provinces after British Columbia.

➢ Each of the Atlantic Provinces saw a sharp increase in commercial-sector energy use (24% overall) between 2000 and 2008, although energy demand in Alberta and Saskatchewan increased the most, by 38% and 33%, respectively, over this period.

➢ Quebec, whose households accounted for only 4% of the country's total natural gas residential use, was the third most important consumer of natural gas in the commercial sector, with 13% of Canadian demand.

Commercial Natural Gas Average Prices 2000-2008, Selected Provinces



➢ The highest commercial natural gas prices in 2008 were found in British Columbia, where they were 91% higher than in Alberta, the province whose prices were the lowest.

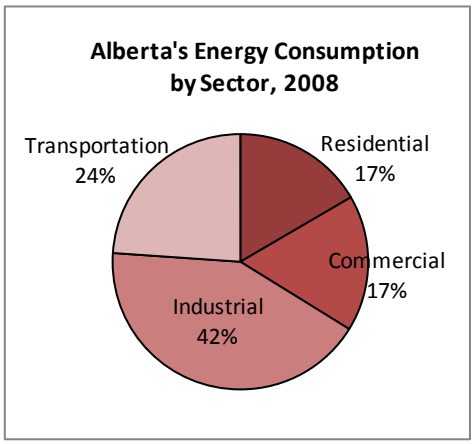
➢ Natural gas prices were similar in British Columbia and Quebec until 2006, but have since remained at about the same level in BC, while dropping sharply in Quebec in 2007.

➢ For commercial electricity, Alberta was the most expensive province in Canada in 2008, with a price 87% higher than in the least expensive province, Manitoba.

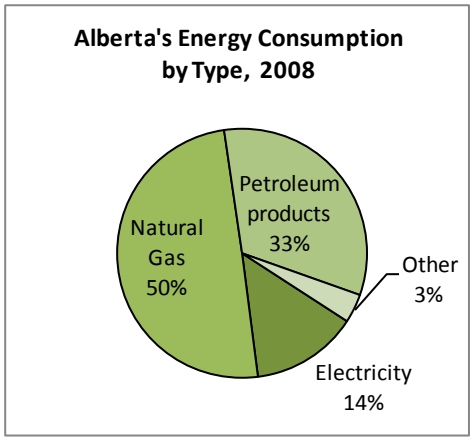
A 28% growth in commercial-sector GDP between 2000 and 2008 was a major driving force in Canada's energy demand during this period. The relative regional weights were the same in the commercial sector as for the residential sector, with Quebec and Ontario being the main consumers, followed by Alberta and British Columbia. In the Atlantic Provinces, in contrast to slow developments in the residential sector, the gradual introduction of natural gas has been accompanied by a surge in commercial-sector consumption of that energy source.

V. Provincial Focus I: *Alberta's Energy Consumption*

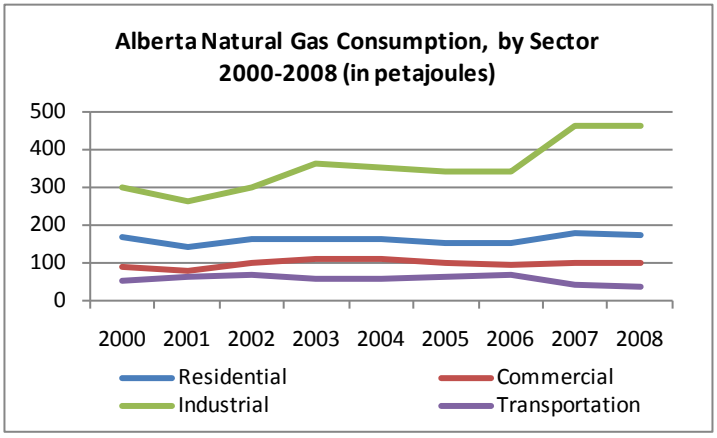
Alberta was the second largest consumer of natural gas in Canada in 2008, accounting for 32.4% of national demand for this fuel. For Alberta's residential and industrial consumers, natural gas provided the major source of energy, meeting about 70% of provincial demand in these sectors. In 2008 energy consumption in Alberta was 25% higher than in 2000. Between 2007 and 2008, however, provincial energy use experienced a slight decrease of 0.6%.



- Alberta's energy consumption in 2008 was led by the industrial sector, while the transportation sector was the 2nd largest energy consumer.
- Between 2007 and 2008, both residential and industrial consumption of energy stagnated. Consumption in the commercial sector increased by 2.6%, while consumption for transportation activities decreased by 2.7%.
- Overall, the commercial and industrial sectors each consumed 38% more energy in 2008 than in 2000, while demand rose by 14% in the transportation sector and by only 3.6% in the residential sector.



- Between 2007 and 2008, consumption of both electricity and natural gas decreased, by 1.9% and 1.2% respectively, while consumption of petroleum products increased by less than 0.5%.
- Alberta accounted for 45% of Canadian industrial natural gas consumption in 2008, much higher than a corresponding value of 31% in 2000.
- Electricity met 14% of Alberta's energy needs in 2008, with electricity consumption increasing by only 8.9% since 2000.

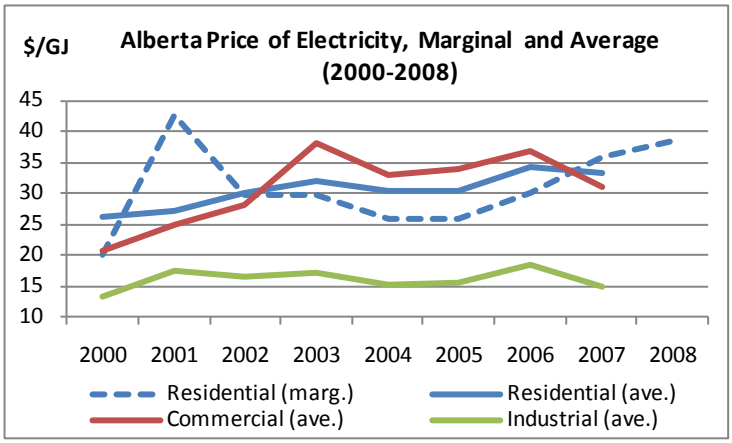


- The largest changes in natural gas consumption occurred in 2007, when industrial consumption increased by over 35% from 2006, while transportation demand decreased by 40% – a drop which continued into 2008.
- Overall, natural gas consumption increased by 27% in Alberta from 2000 to 2008, with industrial demand experiencing the largest increases, at 55%.
- Both residential and commercial consumption of natural gas were relatively steady, with demand increasing by 6% and 9%, respectively, from 2000.

Overall, the province of Alberta did not experience major changes in energy consumption between 2007 and 2008. This is likely related to the fact that both GDP and population growth were also slower than during the immediately preceding years. This apparent stagnation contrasts with the large changes that occurred over the previous year, between 2006 and 2007, particularly in terms of consumption of natural gas, and to a lesser extent consumption of electricity.

VI. Provincial Focus II: *Alberta's Energy Prices*

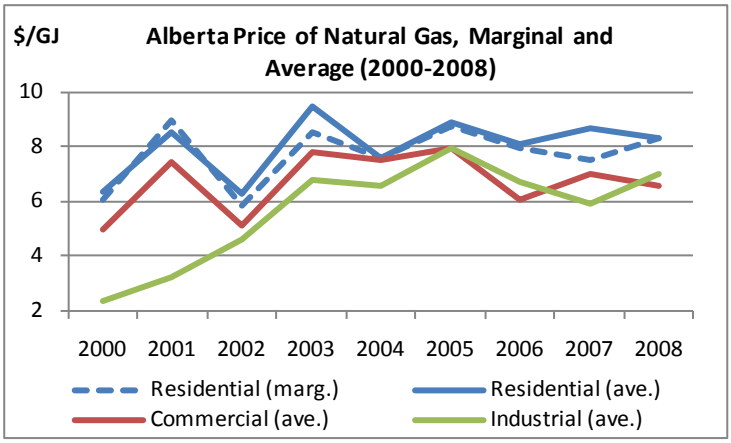
To a certain extent, the composition of Alberta's consumption of energy reflects energy prices in the province. Alberta's high consumption of natural gas is associated with especially low prices compared to some Canadian provinces. On an energy-content basis, electricity prices are about four times higher than the prices of natural gas in the residential and commercial sectors and 2.5 times higher in the industrial sector, and furthermore are some of the highest in Canada.



- During the 2000-2007 period, large fluctuations in average electricity prices occurred in the commercial and industrial sectors (up to 32% and 35% annually, respectively), while in the residential sector, the maximum yearly increase experienced was 12% in 2006.

- In 2007, the average price of electricity was 26% higher than its 2000 level in the residential sector, 51% higher in the commercial sector, and 14% higher in the industrial sector.

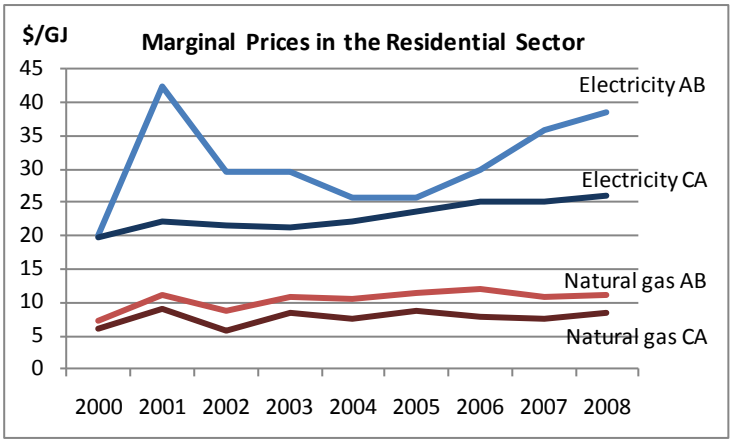
- Alberta had the highest commercial average price of electricity in Canada in 2007.



- The evolution of average natural gas prices between 2007 and 2008 was characterized by relatively small changes in all sectors compared to price movements that occurred over the first half of the decade.

- Since 2000, large annual fluctuations – of as much as 50% – in average natural gas prices have been experienced in many sectors.

- In 2008, average natural gas prices in Alberta were higher than their 2000 levels: by 31 % in the residential sector, 32 % in the commercial sector, and 191 % in the industrial sector.



- Retail price deregulation was introduced in the electricity market starting in 2001; the marginal electricity price in 2001 was more than twice as high as in 2000.

- From 2005 to 2008, the marginal price of electricity in Alberta has again been increasing, gradually moving towards the peak reached in 2001.

- The marginal price of natural gas in Alberta has consistently remained close to the national average.

Since natural gas markets are more geographically integrated than those for electricity, marginal prices of natural gas in Alberta evolve according to a pattern that is similar to the Canadian average. Over the 2000-2008 period, average prices of electricity have increased more than those for natural gas, although apart from the residential marginal price for electricity, electricity and natural gas prices in all sectors have been relatively steady since 2003.

VII. Feature: *Provincial Differences in Industrial Sector Electricity Consumption and Prices*

Canada's residential, commercial, and industrial sectors rely principally on natural gas and electricity to meet their energy needs. In the mid-20th century, light fuel oil (LFO) and heavy fuel oil (HFO) had also been used in large quantities, but over the last 25 years natural gas and electricity have come to dominate the final use energy market. Despite natural gas being consumed in larger quantities, electricity remains a major and dependable source of energy and is used in sizeable quantities in every province.

Typically, fluctuations in the use of electricity in the commercial and residential sectors are similar over time, but in the industrial sector electricity use has evolved somewhat differently. At the Canadian level, consumption and prices of electricity in the industrial sector have both remained reasonably steady over time. There have been periods of rapid increases and decreases in both prices and quantities consumed, but these have typically returned to more 'normal' levels quite quickly. Fluctuations in this sector tend to be smaller than those observed in the residential and commercial sectors, as illustrated in Table 1.

Table 1: Electricity Growth Rates in Canada

	CANADA	2000-2008 growth rate
Average Prices 2000 -2007	Residential	17%
	Commercial	14%
	Industrial	6%
Quantity 2000-2008	Residential	14%
	Commercial	20%
	Industrial	-9%

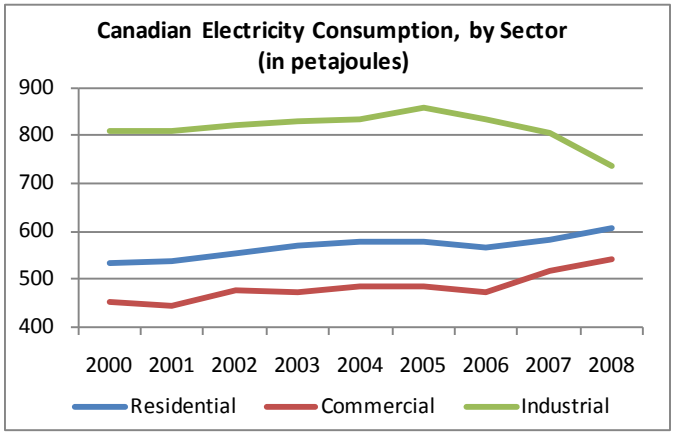
Industrial electricity prices and consumption have, however, evolved quite differently over time depending on location. As discussed in more detail in the following sections, which consider industrial electricity use and prices at the national and provincial levels during the 2000-2008 period (average prices are only available to 2007), provincial differences in industrial energy use have tended to be more pronounced than those experienced in the residential and commercial sectors. Consequently, attention is paid here to the large inter-provincial differences that appear in the industrial sector, despite a rather stable evolution at the aggregate level. Elements of the evolution over time in electricity use and prices in the residential and commercial sectors are provided for comparison purposes.

A. Industrial Electricity Consumption

Steady Canadian Demand

Canadian industrial consumption of electricity was lower in 2008 than in 2000. Demand increased slowly but continuously until 2005, but has decreased at a faster rate subsequently. The progression of the intervening demand movements has been rather smooth, as the largest annual change during this period reached no more than ±4%, with the exception of a –8% change between 2007 and 2008, resulting in an overall change in demand of –9% over the period. By comparison, electricity demand in the commercial and residential sectors in 2008 had increased by 20% and 14%, respectively, since 2000.

Overall, therefore, Canadian industrial demand for electricity seems to be relatively stable over time, especially when compared to residential and commercial electricity demands.



Large Provincial Fluctuations

Across the country, industrial consumption of electricity has been dominated by four provinces: Ontario, Quebec, Alberta, and British Columbia combined account for nearly 90% of national industrial electricity use in 2008. Quebec alone accounted for around 40%, and Ontario about 20%, of industrial electricity demand. While industrial users in other locations use large quantities of electricity compared to other energy sources, these quantities account for only a small part of overall Canadian demand.

Provincially, industrial consumption of electricity decreased substantially over the period 2000-2008 only in the Atlantic Provinces (-15%) and in Ontario (–32%). Electricity consumption in Quebec and British Columbia also decreased, but by much smaller amounts: –4% and –7%, respectively. In the other provinces, growth rates in electricity demand over this period ranged from +1% in Alberta to +16% in Saskatchewan, and +9% in the

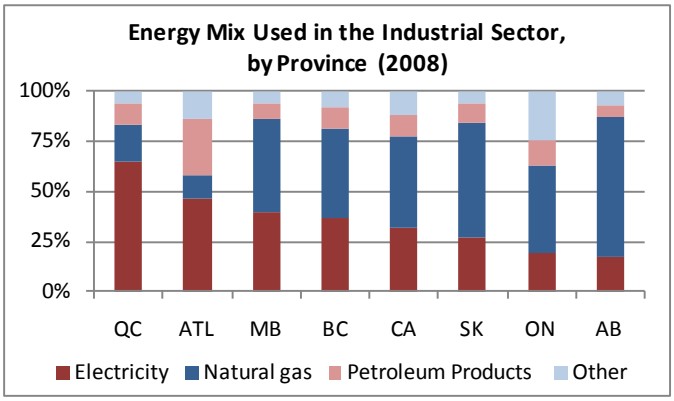
Territories. Thus, although at the national level there is evidence of reduced consumption of electricity in the industrial sector in recent years, there are distinct differences across provinces. In particular, the large decrease in Ontario's industrial consumption of electricity shows the important effect that one (large) province can have on overall Canadian demand.

Looking at the annual rate of change, in no year did consumption for all provinces move in the same direction. There is no pattern of general increase or general decrease in any year. Provinces that experienced growing electricity demand over the period did not do so in every year, and the same holds for provinces that experienced an overall reduction in their electricity consumption. In addition to the *directions* of change, the *extents* of the annual changes are also very dissimilar across provinces.

Industrial demand in Quebec increased at the beginning of the period, stagnated from 2004-2006 and decreased afterwards, for an overall change of –4% between 2000 and 2008 characterized by small annual variations. The overall decrease in Ontario's industrial electricity demand resulted from an almost continuous series of annual decreases over the period. The largest single-year loss, in 2007, amounted to 17% of the previous year's consumption. Most other provinces experienced annual changes that fell between the small changes seen in Quebec and the large fluctuations in Ontario. While for some provinces the demand for electricity stagnated during the first half of the decade, in other provinces, it increased slightly. In most provinces though, large decreases in electricity demand were experienced in 2007 and, for the most part, also in 2008, with many of these exceeding 10%.

In comparison, inter-provincial differences are not as pronounced in the residential and commercial sectors. For example, in both these sectors all provinces followed the national pattern of increasing electricity consumption over the period. The 2000-2008 growth rates ranged from +4% to +29% across the various provinces in the residential sector and from +2% to +35% in the commercial sector. Obviously, these rates of change differed across provinces, but these differences were not larger than those observed in the industrial sector; overall, patterns in the residential and commercial sectors were more similar across provinces than in the industrial sector.

An additional area where inter-provincial differences are present but are not reflected in the national data pertains to the share of electricity in the total energy mix of each province. Electricity represents over 60% of Quebec's industrial consumption of energy. Although Ontario and Alberta are also very industrialized, electricity represents less than 20% of industrial energy requirements in these provinces.



The way in which the importance of electricity has evolved over time has also differed across provinces. In Quebec, electricity has become a more important source of industrial energy over the years. It represented only 57% of Quebec's energy mix in 2000 but 65% in 2008. In all other provinces, the share of electricity in industrial energy demand has been decreasing during the first decade of the 2000s, with the largest drops occurring in Ontario and Alberta. Thus, inter-provincial differences in the use of electricity as compared to other sources of energy were not as pronounced in 2000 as these were in 2008. But these differences were already substantial in 2000, with electricity fulfilling only 24% of industrial energy needs in Alberta and Ontario.

Also of interest is the distribution of provincial electricity demand across sectors. While in some provinces, like Ontario, the residential, commercial and industrial sectors consume similar amounts of electricity, in other provinces, the distribution of the demand for electricity across sectors varies markedly. In Alberta for example, the distribution of electricity use was more skewed towards the industrial sector, as natural gas is the major source of residential energy due to its use in space heating, so that most of the electricity consumed in this province was used by industry.

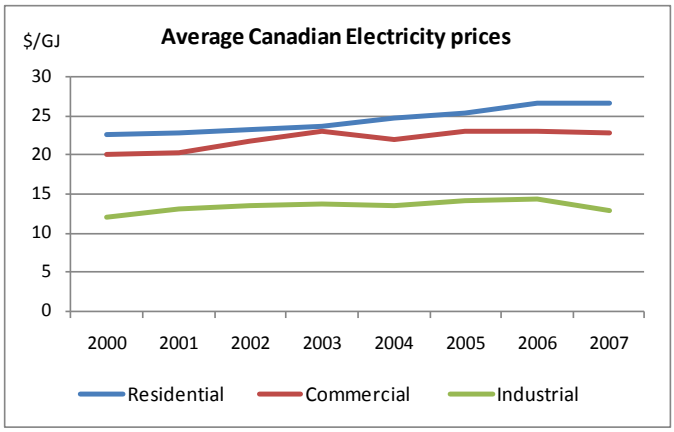
Another related area of interest, though not developed here, concerns variations in electricity demand among the Atlantic Provinces. Specifically, very different patterns over time are observed in different provinces in this region.

B. Industrial Electricity Prices

Increases in the Canadian Price

Historically, electricity has been less expensive in the Canadian industrial sector than in the commercial and residential sectors. The average prices of electricity faced by industrial users have been at least $1.8 per GJ less than those seen in other sectors since 1958. At the beginning of the 1980s, the price gap between the sectors grew quickly, and by the early 1990s, electricity

was over $8 per GJ more expensive in the commercial and residential sectors than in the industrial sector. (All the prices discussed and presented here include taxes and rebates applied at local, provincial and federal levels.)



Over the 2000-2007 period, the average industrial price of electricity increased steadily in Canada as a whole, with the exception of decreases in 2004 and 2007. Between 2000 and 2006 the electricity prices faced by industrial users increased by just over $2.25 per GJ. In 2007, the price lost about 10% of its value and dropped back to a level close to that seen in 2000. This 2007 drop was the largest change in the industrial price seen since the beginning of the 1980s (following the rapid price increases of the 1970s), and was mainly due to price reductions occurring in Ontario and Alberta. Despite this, the average price in Canada gained about 6% over the 2000-2007 period, and annual variations, 2007 excluded, were rather small, making the price evolution at the aggregate level rather steady.

In comparison, the residential and commercial sectors saw greater variation in prices. In these two sectors, electricity prices rose on average by 17% and 14%, respectively, from 2000 to 2007. These price paths, with years of small increases, years of rapid growth and years of slight reductions, appear to be less predictable than those experienced in the industrial sector.

A Variety of Price Patterns across Provinces

The provinces with particularly low average industrial prices were Quebec, Manitoba, and Newfoundland. Industrial users in Ontario and Prince Edward Island encountered the most expensive electricity on average over the period. While for many provinces the minimum price occurred prior to 2003 and the maximum after 2004, other characteristics of the price paths were dissimilar. Ontario, New Brunswick and Saskatchewan provide three examples of provinces with price changes that have little in common.

Ontario reached its highest price in 2005, which corresponds to the highest price of electricity for this sector since 1960. However, quick price drops totaling more than 40% over the two subsequent years resulted in 2007 prices that were the lowest experienced in the province since 1991. In 2005, the price spike in Ontario resulted in the second highest industrial electricity price among all provinces, and by 2007 prices were14% less than they had been in 2000 and less than the 2007 average national price. New Brunswick, on the other hand, had its highest price of the 2000-2007 period occur in 2001, which was then immediately followed by its lowest price in 2002. Between 2001 and 2002, the price decreased by almost 27%. However, the average price increased gradually afterwards, ending up 17 % higher in 2007 than it had been in 2000. In comparison, Saskatchewan experienced a relatively stable and continuous increase in its industrial electricity prices. In this province, the price surged at the beginning of the period, stagnated between 2003 and 2006, and increased again sharply in 2007.

Wide Fluctuations in Industrial Prices

If the Atlantic Provinces were shown individually, differences across provinces in the industrial prices of electricity would be seen to be extremely large. The highest industrial price of electricity in 2007 occurred in Prince Edward Island, where it reached $27 per GJ, making electricity more than four times more expensive than in Newfoundland, which had Canada's lowest price at $6 per GJ. With the Atlantic Provinces considered as a group, however, the range between the most and least expensive industrial electricity prices in Canada narrows. At this level of aggregation, Saskatchewan in 2007 exhibits the highest average price of electricity, some 80% higher than in Manitoba, the province with the lowest average industrial electricity price.

Most annual provincial growth rates for electricity prices are positive in the residential and commercial sectors. Residential price changes tend to range from 0 to 6%, with a few exceptions reaching above 8%; while most annual changes in commercial prices fall between -5% and +10%, again with a few exceptions. The corresponding annual changes in average provincial prices of electricity in the industrial sector are spread over a much wider range: –10% to +20%.

Taxes

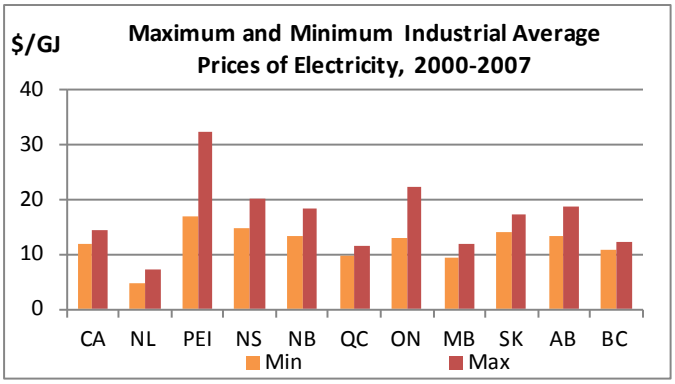
Average and marginal prices have both been computed so as to reflect the after-tax prices in effect in each province. From 2000 to 2008, only Manitoba, Saskatchewan and British Columbia applied taxes on the industrial consumption of electricity. At the federal level, electricity was exempt from GST. Manitoba

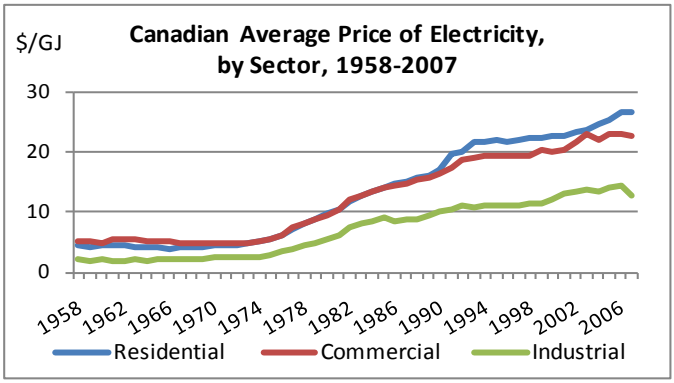
applied a provincial tax of 7%, but offered substantial rebates to industrial consumers, bringing the implicit tax rate to just over 4% during the period. In British Columbia, a similar tax has been in effect since 2000. There the initial tax rate of 7% was increased to 7.5% from mid-2002 to mid-2004 and returned to 7% thereafter. Moreover, since September 2004, a 0.4% carbon tax has been applied on top of the provincial tax, making industrial electricity consumption in this province the most highly taxed in the country. In Saskatchewan, the tax level was 7% in 2000 but was reduced over the period, reaching 5% in 2008.

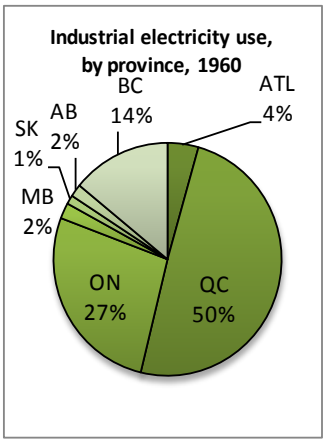
Summary

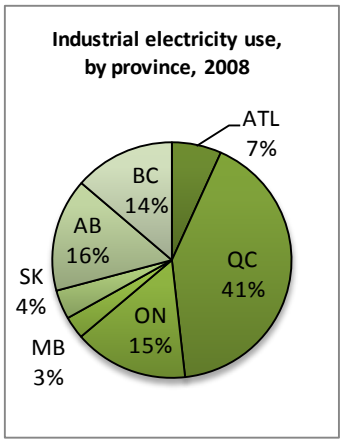
When aggregated at a national level, the industrial consumption and price of electricity in Canada follow a fairly smooth path over time. This aggregation, however, masks the fact that industrial electricity consumption and prices have experienced larger inter-provincial differences over time than have occurred in the residential and commercial sectors. However, the industrial prices remain substantially below those faced by other purchasers of electricity in Canada.

C. Industrial Electricity Snapshots









- The smallest difference between minimum and maximum provincial prices was just over $1.30 per GJ in BC; the largest difference was about $15.40 per GJ in Prince Edward Island.
- Most provincial average prices over the 2000-2007 period are within ±$4 per GJ of the Canadian average.
- Only in Newfoundland and Prince Edward Island did prices differ from the national average by more than $4 per GJ.
- The average industrial electricity price in Canada has increased almost every year since 1958. With the exception of 2007, no annual price decreases exceeded 6%.
- Between 1974 and 1981, industrial electricity prices increased by more than 10% every year.
- The gap between the industrial price and the residential and commercial prices was less than $3 per GJ until 1976 but has exceeded $8 per GJ since 1991.
- The industrial sectors of Alberta, Saskatchewan and the Atlantic region markedly increased their shares of total Canadian industrial electricity consumption during the second half of the 20th century.
- Electricity consumed by the industrial sector of Ontario has become less important at the national level, especially since the early 1980s.
- Quebec's share of Canada's industrial electricity consumption fell to only 35% in 1973, but has increased to around 42% in the last few years.

CBEEDAC CANADIAN ENERGY USE DATABASE

Description of Content and Sources

As part of its objective of improving accessibility and expanding knowledge of energy end-use data, CBEEDAC has been collecting comprehensive data on energy consumption in Canada. The collection and archiving of these economic data series facilitate study of the evolution of energy consumption and of the factors driving energy demand, and allow inter-provincial and international comparisons.

The database assembled by CBEEDAC researchers covers the period from **1958 to 2008** and provides information for **each province, the territories, and for Canada** as a whole. The data series contain yearly information on the consumption and prices of **electricity, natural gas, fuel oil and other petroleum products, wood, and other types of energy**. Data on supplementary factors expected to influence the demand for energy, such as weather, population or the availability of particular energy sources, have also been included. Specifically, the dataset contains series for the following items:

- Quantities consumed
- Average prices (before and after-tax)
- Marginal prices (before and after-tax)
- Taxes
- Availability of natural gas (distribution pipelines)
- Population
- Weather conditions
- Economic variables (government expenditures, personal income, gross domestic product)

Quantities, prices and tax levels are detailed for each of the **residential, commercial and industrial sectors** and for each type of energy mentioned above, while quantities of energy consumed by the **transportation sector** are also available. The other information is not sector specific.

Most of the data are obtained from Statistics Canada publications, the National Energy Board, Environment Canada, or Canadian utility companies. In order to assemble some of the series, such as the after-tax prices, extensive manipulation by CBEEDAC researchers has been required.

This dataset provides a base for current and future research projects initiated by CBEEDAC researchers and their partners. These series are not available through CBEEDAC for direct public use. However, CBEEDAC staff undertake specific limited requests from external organizations regarding information contained in, or using, this database, and is interested in entering collaborative relationships with other parties to provide more extensive analysis based on these or other data.

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