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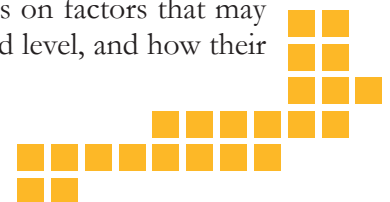
Canadian and US Energy Use in Perspective

With vastly different population sizes and densities, endowments of natural resources, geography, and climate, it might be expected that Canada and the US would differ in many aspects of their energy use. Yet offsetting these differences to some extent, the two countries share a common border, are similarly industrialized, are partners in a free-trade agreement, and indeed the US is by far Canada's largest export market, where much of those exports comprise energy products. Regardless of these similarities and differences, the US provides a valuable reference point when it comes to studying energy use in Canada.

Perhaps not surprisingly, in view of the abundance of studies and data available on energy consumption in the US, as well as the many programs and policies in place there, considerable research efforts and policy-oriented initiatives regarding Canadian energy use appear to have been at least partly inspired by the US experience.

In two recently-completed projects, CBEEDAC researchers explored the differences and similarities that exist in end-use consumption of energy between Canada and the US. Patterns of energy consumption by sector and by energy source, and their changes over time, were examined at both the aggregate level and for households. As well as potentially being of interest in their own right, these studies provide a high-level view of how Canada compares in the energy use context in regard to its closest neighbour, and may help provide context when considering the extent to which US-inspired studies and initiatives may or may not be appropriate for Canada.

In the first of the two summaries of these two studies included in this newsletter, some of the main similarities and differences in aggregate energy consumption patterns are detailed for the two countries over the 1960 to 2008 period. The second summary focuses on factors that may be influencing energy consumption at the household level, and how their impact differs across the border.

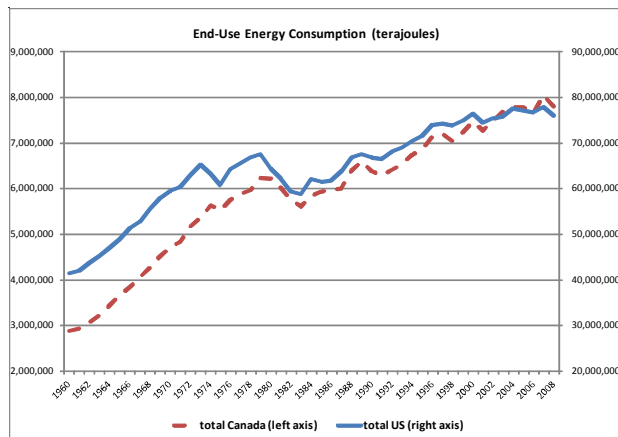


A COMPARISON OF AGGREGATE ENERGY CONSUMPTION IN CANADA AND THE UNITED STATES

Noha Abdel Razek and David L. Ryan

At the Aggregate Level

Data series assembled primarily from Statistics Canada and from the US Energy Information Administration reveal an increasing trend in end-use energy consumption over the past 50 years in both Canada and the US. In Canada, however, end-use energy consumption increased 2.7 times between 1960 and 2008, compared to 1.8 times in the US. Nevertheless, energy consumption in both countries follows a similar pattern, with total energy use decreasing in the early 1970s and again between the late 1970s and early 1980s, reflecting the OPEC price shocks, and then increasing relatively steadily again after the mid 1980s.



Dissimilarities between the two countries appear, however, with a sector-based examination of energy end use. In Canada, energy end use by the residential and industrial sectors has been increasing moderately since 1979 (less than 10% and 13%, respectively) while the largest increase was experienced by the commercial sector (70%). Energy used for transportation activities also increased substantially (30%) over the same period. In the US, energy used by the transportation and commercial sectors increased between 1979 and 2008 by between 37% and 38%, while energy end use by the residential sector increased moderately

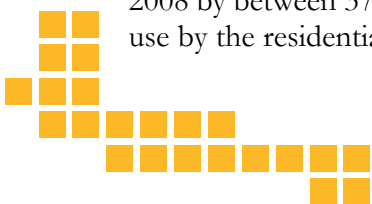
(12%), as in Canada. The US industrial sector, however, reduced its consumption of energy by 12% from 1979 to 2008, despite a period of higher energy use by this sector in the 1990s.

Beyond this, large differences appear mostly in the change over time of the quantity shares of total end-use energy consumption of each sector in each country. For transportation, this share increased by 12 percentage points between 1960 and 2008 in the US, but only by 3 percentage points in Canada. Conversely, from 1960 to 2008, the industrial sector's share decreased by 13 percentage points in the US while it decreased only by 4 percentage points in Canada.

Energy Sources

In the residential sector, electricity and natural gas are the major sources of energy used in both countries, with quantity shares in 2008 of approximately 40% for both these fuels in each country. In Canada, these quantity shares relative to other types of energy sources both increased until the early 1990s, but have been relatively steady since then. In the US, the electricity quantity share in the residential sector has increased relatively steadily throughout the 1960 to 2008 period, but the natural gas quantity share has been slowly decreasing since the early 1980s.

Trends in the quantity shares of the various fuels differ somewhat in the commercial sectors for Canada and the US. In Canada, natural gas and electricity have both had similar shares in this sector since the late 1980s, but these have decreased since the early 2000s as the quantity share of refined petroleum products (RPP) has increased. By 2008, the quantity shares for natural gas and electricity are only slightly higher than for RPP. In the US commercial sector, the electricity quantity share has exceeded the share for natural gas since the early 1990s, and by 2008 is almost 1.5 times as large. The share for petroleum products has steadily



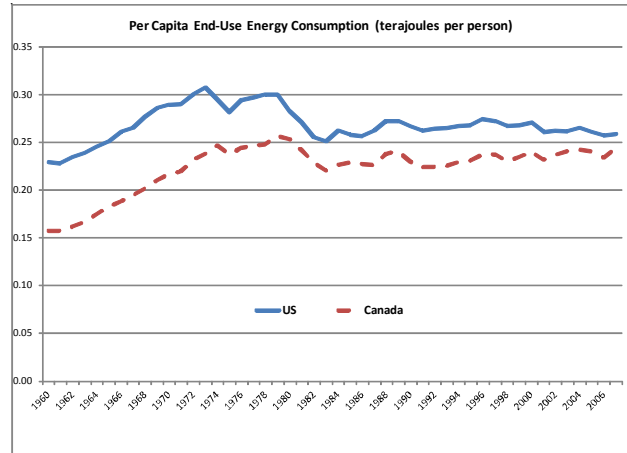
decreased and since the early 2000s has been less than 10%.

The main differences in energy end-use consumption between the two countries in the industrial sector relate to the quantity shares of petroleum products and natural gas. While petroleum products and natural gas have similar shares in the US, at around 35%, in Canada, the quantity share of RPP has been close to 10% since the early 1990s. Since the late 1960s, the quantity share of natural gas in Canada has exceeded electricity's share, but both shares have been at or above 35% since the mid 1990s until recently, when the natural gas share increased while the electricity share fell. In contrast, in this sector in the US, the quantity share for electricity remains below 15%, although it has increased since the 1960s.

Energy Intensities

Energy end use consumption per unit of GDP shows that both countries use energy with a similar intensity, which has been downward trending at a decreasing rate since the early 1960s. Even the extent and timing of the reduction is similar in both countries: a decrease from 0.075 terajoules of energy per thousand dollars of GDP in the US in 1960 (0.071 in Canada) of 50% by 1975 and 75% by 1982 (1983 in Canada). An alternative energy intensity measure, energy end-use per capita, is slightly higher in the US than in

Canada, although it follows a similar pattern in both countries: a general increase until the mid 1970s, followed by a reduction between 1979 and 1983, and then remaining relatively constant since the early 1990s, although with a slight increase in Canada.



Summary

Overall, at the aggregate level, the reduction in consumption of petroleum products in the late 1970s to early 1980s, particularly in the industrial and transportation sectors, is perhaps the most important change in the energy use pattern of each country. Major differences between the two countries are observed in the choice of energy source consumed, particularly in the commercial and industrial sectors.

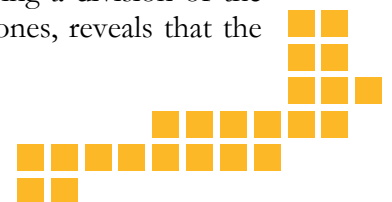
ENERGY-RELATED CHARACTERISTICS OF CANADIAN AND U.S. RESIDENTIAL DWELLINGS AND TECHNOLOGIES

Lucie Maruejols and Denise Young

Despite the similarities between energy end-use consumption at the aggregate level in the residential sectors in Canada and the US, as described in the preceding article, there are a number of disparities that become evident when the focus is moved to household-level energy consumption. A recent CBEEEDAC study examined energy end use by Canadian and US households using data from the most recent Survey

of Household Energy Use (2007), for Canada, and Residential Energy Consumption Survey (2005 and 2009) for the US.

At the national level, the data show a higher residential energy consumed per household in Canada, with 105.9 GJ per household in 2007, than in the US, with 100.1 GJ per household in 2005. A regional analysis however, using a division of the US territory into 5 climate zones, reveals that the





Canada and US Household Energy Use Comparisons (Cont'd)

two coldest zones in the US (Zone 1 and Zone 2) have energy consumption of 124.4 and 121.3 GJ per household, which is higher than the Canadian average. In Canada, only Alberta, with 129.9 GJ per household, exceeds the energy intensity of the coldest US zones.

There are a variety of factors that could potentially explain these differences, including dwelling type and characteristics, as well as the type of heating and cooling equipment that is present, along with the stock of various other household appliances and entertainment products.

Analysis of the two data sets reveals that in the two coldest zones in the US, the housing stock is generally older, and hence likely to be less energy efficient than in Canada. Canadian dwellings are more likely to have more energy efficient double- and triple-pane windows than US dwellings. In addition, dwellings in the coldest areas of the US are on average larger and more likely to be single-detached than in Canada, two features that potentially increase the heating requirements. On the other hand, Canadian households were less likely to choose relatively low indoor temperature

settings during the heating season than US households in the cold zone, and were also less likely to be equipped with the most recent vintage of heating system.

Although some standard equipment such as microwaves and refrigerators are adopted by almost all households in both countries, a number of appliances are found more often in Canadian households, such as stand-alone freezers (63% compared to 30% in the US), stoves (95% versus 90%) and dishwashers (65% versus 59%). Canadian households also tend to cook at home more frequently than their US counterparts: only 32% of US households cooked several times a day, compared to 53% of Canadian households.

In terms of entertainment products, Canadians are more likely than Americans to own a computer, a DVD player or a home theatre system. However, US households were more likely to have multiple sets of televisions and computers.

More details about these results, as well as comparisons based on other characteristics, are available in the full CBEEDAC report which is available on the CBEEDAC web page.

Energy Use per Household (GJ) in Canada (SHEU-2007) and in the US (RECS-2005)

Country	Region						
Canada	ALL	Atlantic Region	Quebec	Ontario	Prairies	Alberta	British Columbia
	105.9	114.7	94.7	106.5	115.4	129.9	96.9
US	ALL	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	
	100.1	124.4	121.3	107.3	80.6	76.4	

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