

Energy Needs: The Ways We Use Energy



Energy Revealed Backgrounder

Think about the amount of energy used to create these roads, buildings, and cars. Add to that the energy used to keep the buildings warm, the streets lit, and the cars moving.

Almost everything we use in our daily lives takes energy to make or to operate or both. We need energy to bring us the water we drink, the food we eat, the clothes we wear, even the chairs we sit on. We need energy for the electricity we use to light our homes and to power all our appliances and computers. Unless we walk or ride a bike, we also rely on a source of energy every time we travel from one place to the next.

The amount of energy we use matters. Most energy comes from non-renewable sources such as oil and coal. These resources have brought us tremendous conveniences, but they also create serious problems for the Earth and its ecosystems. Making a car, for example, creates 5.22 tonnes of carbon dioxide (CO₂), a greenhouse gas that pollutes the environment and leads to climate change. Of course, using gas and oil to run the car creates even more.

Before we take big steps to change people's use of energy, it helps to understand why they need energy and what they use it for. This backgrounder focuses on just that, on our energy needs and use in Canada.

How Much Energy Do Canadians Use?

Countries really vary in the amount of energy they use. Overall energy consumption tells you the total

amount of energy used by a country. Table 1 ranks ten countries according to their energy consumption. The higher up in the list a country is, the more energy it uses.

Table 1: Energy Use in Ten Selected Countries in Million Tonnes Oil Equivalent, 2019

Country	Energy Use in Million Tonnes Oil Equivalent	Percent of World Energy Use (%)
China	3384.4	24.3
United States	2260.7	16.2
India	813.5	5.8
Japan	445.9	3.2
Canada	339.4	2.4
Germany	313.8	2.3
France	231.2	1.7
United Kingdom	187.2	1.3
Mexico	184.4	1.3
Australia	153.1	1.1

Source: BP Statistical Review of World Energy, 2020.

Million tonnes oil equivalent is a unit of energy equal to the amount of energy contained in a million tonnes of crude oil. Oil equivalent allows us to look at the energy from a variety of sources, not only oil and gas but also hydropower, for example, with one consistent standard of measure.

At 339,400,000 tonnes of oil equivalent, Canada used less energy than several of the countries listed above: the United States, China, Japan, and India. Overall, 2.4% of the world's energy use in 2019 was Canadian.

Looking at countries' energy use alongside their population can tell you even more about their energy consumption. Table 2 lists the same ten countries by population, with the most populated country first.

Table 2: Population and Energy Use in Million Tonnes Oil Equivalent, 2019

Country	Population	Energy Use in Million Tonnes Oil Equivalent
China	1,389,618,778	3384.4
India	1,311,158,140	813.5
United States	328,239,523	2260.7
Mexico	127,455,990	184.4
Japan	125,555,208	445.9
Germany	80,230,554	313.8
France	67,625,957	231.2
United Kingdom	65,405,533	187.2
Canada	37,350,365	339.4
Australia	25,113,987	153.1

Source: International Data Base (IDB), United States Census Bureau, 2021.

You might expect that the countries with the most people would use the most energy, but that is not always the case. Canada does not have a lot of people compared to many other countries, but it is one of the countries that uses the most energy.

Table 3 looks at the same ten countries and lists how much energy they use on a per person, or per capita basis. When we look at per capita energy consumption, Canada ranks very high.

Table 3: Energy Use Per Capita in Million Tonnes Oil Equivalent

Country	Energy Use Per Person
Canada	9.09
United States	6.89

Australia	6.10
Germany	3.91
Japan	3.55
France	3.42
United Kingdom	2.86
China	2.43
Mexico	1.45
India	0.62

To calculate energy use per capita, we used this equation:

$$\text{Energy Use Per Capita (per person)} = \frac{\text{Country's Energy Use}}{\text{Country's Population}}$$

For example, as you can see in Table 1, Canada used 339.4 million tonnes of oil equivalent in 2019.

If, as you can see in Table 2, there were 37,350,365 people in Canada at that time, then average person used:

$$\text{Energy Use Per Capita (per person)} = \frac{339,400,000 \text{ tonnes}}{37,350,365 \text{ people}}$$

$$\text{Energy Use Per Capita (per person)} = 9.09 \text{ tonnes}$$

That's just over nine tonnes of oil equivalent on average for each Canadian!

In weight, a tonne is about the same as a rhinoceros. Or a Volkswagen beetle. Nine rhinos or nine cars per person, that's a whole lot of energy!

Why Do Canadians Use So Much Energy?

There are many reasons why Canada uses a lot of energy per capita:

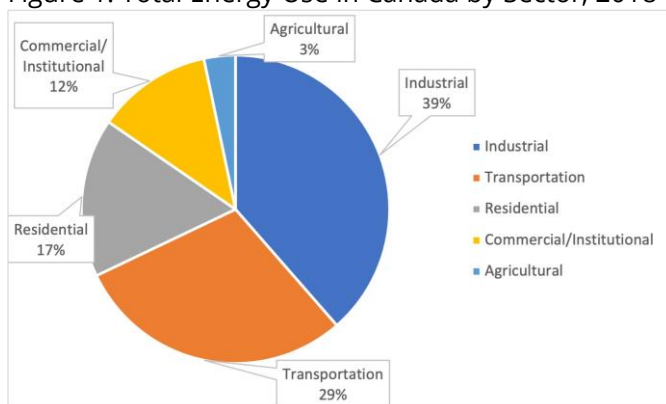
- We are a northern country with a cold climate. We use a lot of energy to heat our homes and other buildings.
- We are a very large country with a small population. People travel great distances to see one another, and products get transported great distances so that we can all buy and use them. We use a lot of energy for travelling and other transportation.

- We have many natural resources in Canada such as oil, coal, natural gas, and water. We use these natural resources here, and we export some of them to other countries. Canadian industries use a lot of energy as they go about their businesses, to refine iron and make steel, for example, and to create roads and transport materials.
- We are a wealthy, industrialized country that can extract and produce energy at a low cost. The availability and cost of energy do not prevent us from doing the things we want to do.

How Do Canadians Use Energy?

Energy use is often divided into sectors. Figure 1 shows the energy use in Canada in 2018 in each of five sectors of society: industrial, transportation, residential, commercial/institutional, and agricultural.

Figure 1: Total Energy Use in Canada by Sector, 2018



Source: Office of Energy Efficiency, Energy Use Data Handbook (Natural Resources Canada, 2019).

Products We Use: The Industrial Sector

39% of Canada's energy use in 2018 went to the industrial sector. That sector includes all the large industrial processes: pulp and paper, mining, other manufacturing, oil and gas, iron, and steel, smelting and refining, chemicals, cement, construction, and forestry.

When people think about the need to use less energy, they often think about the industrial sector. Because it is the sector with the greatest energy use in Canada, it is often the focus of energy conservation efforts.

It is important to remember that industry is not only in the hands of large companies. Our choice to buy a company's products creates the demand for those products. If we make different choices, we can shrink that demand, and with it, the energy use of different industries.

Companies can do a great deal to reduce their energy use, but so can individuals. The average North American indirectly consumes 55 kg of matter every day. We are making many choices about a lot of matter, whether we realize it or not.

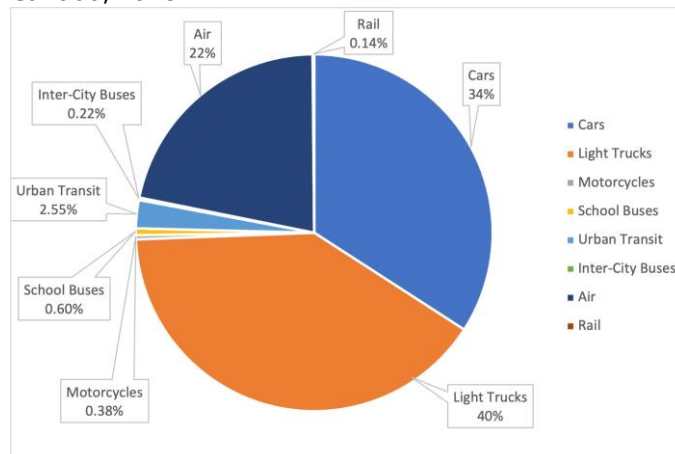
Planes, Trains, and Automobiles: The Transportation Sector

29% of Canada's energy use in 2018 was for transportation. The transportation sector includes the use of cars and SUVs, trucks of all sizes, buses, airplanes, helicopters, and trains. The energy use of this sector refers not only to personal transportation (the car trips and flights taken by individual people), but also the transportation of freight. Goods need to be transported from where they are made to the places where they are sold and used.

In 2018, 42% of the energy use for transportation went to transporting freight, while 53% went to transporting people. The other 4% went to what is called off-road transportation, the energy use of recreational vehicles such as snowmobiles and jet skis as well lawnmowers. Canadians are beginning to reduce the energy they use for transportation by buying local products that are not transported great distances, for example, and by choosing to drive less or travel in an energy-efficient vehicle.

Figure 2 shows the amount of energy used for different kinds of personal transportation in Canada in 2018. It includes the amount used by cars, small trucks (which include vans and SUVs), airplanes, buses, motorcycles, and trains. It does not include bicycles since they have the advantage of not needing any energy to run, except for human energy.

Figure 2: Energy Use for Personal Transportation in Canada, 2018



Source: Office of Energy Efficiency, Energy Use Data Handbook (Natural Resources Canada, 2019).

Our Homes: The Residential Sector

The residential sector includes our places of residence, whether it is houses, apartments, or condominiums. In 2018, 17% of the energy used in Canada was used by the residential sector.

Because of the cold climate in Canada, more than half of the energy we use at home is for heat. The residential sector also uses energy to heat water, to run appliances and air conditioners, and to use lighting. It takes energy to heat the water for your shower, to run the television and computer, and to light your home.

Businesses and Institutions: The Commercial /Institutional Sector

The commercial/institutional sector includes buildings other than our homes such as businesses, hospitals, universities, schools, and jails. 12% of the energy use in Canada in 2018 went to this sector. These buildings rely on energy in several ways. As with homes, most of the energy use is for heat. Indoor lighting also requires a lot of electricity. In schools, for example, more than half of the electricity we use is for lighting. Computers and photocopiers use a lot of electricity as well. As in the residential sector, here energy is also needed to heat water and run air conditioners.

Farming: The Agricultural Sector

The use of energy by the agricultural sector is a very small percentage, just 3%, of Canada's overall energy consumption. On farms across Canada, energy is used to operate equipment such as tractors and combines.

Will Canadians Find Ways to Use Less Energy?

As we understand the ways we use energy, we can begin to think about how to use less energy in all five sectors: in Canadian industry, in our methods of transportation, in our own homes, at school or work, and on farms.

Some people believe that since Canada uses much less energy than some other countries (such as the United States, China, and Japan), we do not need to worry about our overall energy consumption. Others believe that, for the sake of the Earth and its ecosystems as well as future generations, we must.

Many Canadians have already begun to change. They are finding ways to live healthy, comfortable lifestyles while also reducing their energy use. They are conserving the amount of energy they use day-to-day. They are choosing the new technologies that offer better energy efficiency. And they are looking for ways to rely more on renewable energy and less on non-renewable energy.

Canada may not always have such a high energy consumption per capita, that will depend on Canadians like you. In a recent survey, 93% of Canadians said they would be willing to make a sacrifice for the environment. What changes would you be willing to make?