

# The Value of Energy – New Brunswick

Canadians for Affordable Energy:  
Household Research Series

JUNE 2019





Canadians for Affordable Energy is a national non-profit organization. We promote the benefits of affordable energy by informing Canadians about it, advancing policies that encourage it, and building a national constituency to support it. Keeping energy services affordable must be an ongoing public policy priority.

### **Household Research Series – New Brunswick Notes**

The energy price and cost data contained in this New Brunswick Household Research Report are approximate and represent how much residential customers might pay for various energy products, using timely data from credible sources, including New Brunswick Power for electricity, Enbridge Gas New Brunswick for natural gas, Natural Resources Canada for gasoline prices,

Wood Pellet Association of Canada for wood pellet pricing, and Statistics Canada for heating oil costs.

New Brunswick Power is the only electricity utility and all residential customers pay the same rate. Enbridge Gas New Brunswick is the province's only natural gas distributor.

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### **Contact**

Address: P.O. Box 3923,  
Saint Andrews,  
New Brunswick, E5B 3S7

Website: [www.affordableenergy.ca](http://www.affordableenergy.ca)  
Email: [info@affordableenergy.ca](mailto:info@affordableenergy.ca)  
Facebook: <https://www.facebook.com/canadiansforaffordableenergy/>



This report was developed by Richard Laszlo and his team at Laszlo Energy Services (LES). LES provides customized energy policy, strategy and communications expertise to natural gas, thermal and electric utilities, real estate property managers and developers, technology and service providers, and government clients.

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## Summary

The federal government's carbon pricing program (aka carbon dioxide emissions tax or carbon tax) is set to have a moderate impact on the pocketbook of New Brunswick energy consumers: families and businesses. Due to New Brunswick's fossil fuel intensive electricity generation mix, the carbon content of energy from electricity is high relative to other popular sources.

Over 60 percent of New Brunswick households use electric resistive heating to warm their homes. If a \$50/tonne federal carbon tax is imposed, those electricity costs could increase by 11 percent. At \$50/tonne, gasoline prices would increase by 10 percent.

This increase in electricity costs is of particular concern because electricity accounts for 72 percent of the average New Brunswick resident's energy bill, where gasoline accounts for 28 percent. Natural gas is not widely available.

Heating with wood pellets is the lowest cost alternative for New Brunswick residents. Typical New Brunswick households that rely on electricity for their energy needs might spend \$4,418 a year to heat their homes and power their appliances. Those that use a combination of heating oil and electricity energy typically might spend \$4,335. Finally, households that heat with wood pellets might spend \$3,052 each year.

Government energy policymakers have a significant impact on household energy budgets. Changes to New Brunswick's energy infrastructure and mix should be done prudently since decisions made today will have lasting consequences on the supply of energy and its long-term affordability.

With New Brunswick's ratepayers relying heavily on electricity for their energy needs it's important that governments recognize this and ensure that the province maintains an affordable and reliable supply of energy for consumers.

# *The Value of Energy Research Series illustrates energy bills, energy use and energy value for a typical New Brunswick household*

Values shown are approximate and represent how much a typical residential customer might pay for various energy products, using timely data from credible sources, including New Brunswick Power, Enbridge Gas New Brunswick, and The New Brunswick Energy and Utilities Board.

## *To give us an idea of The Value of Energy, let's look at New Brunswick's energy uses*

**The chart shows where a typical customer might get their energy:**

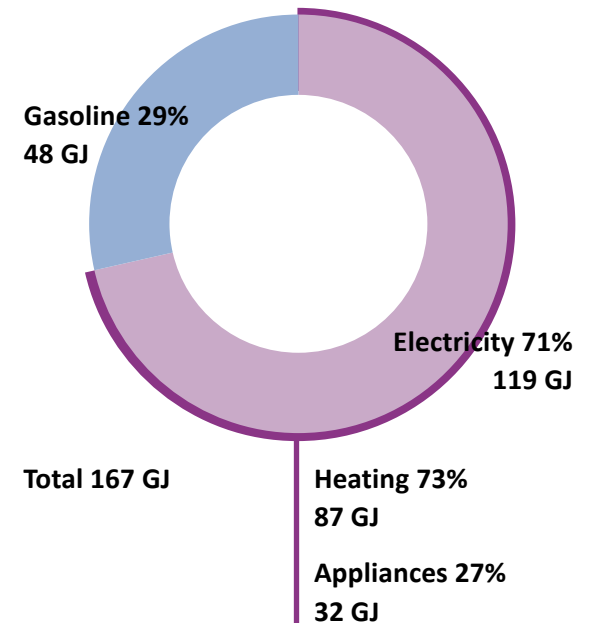
- Electricity provides 71%
- Gasoline provides 29%

**But not every household has this breakdown** – this is an estimate based on a household that uses electricity for heating, appliances and electronics, and drives a car occasionally.

Approximately 180,000 New Brunswick households – over 50% of the total – use electricity for heating (electric resistive heating). The remaining homes rely on oil, wood, natural gas, heat pumps, propane, coal or some combination for heat.

### **We use gasoline to fuel**

- Vehicles (cars and trucks) to get around and deliver goods and services
- Recreational motorbikes, boating and skidoos



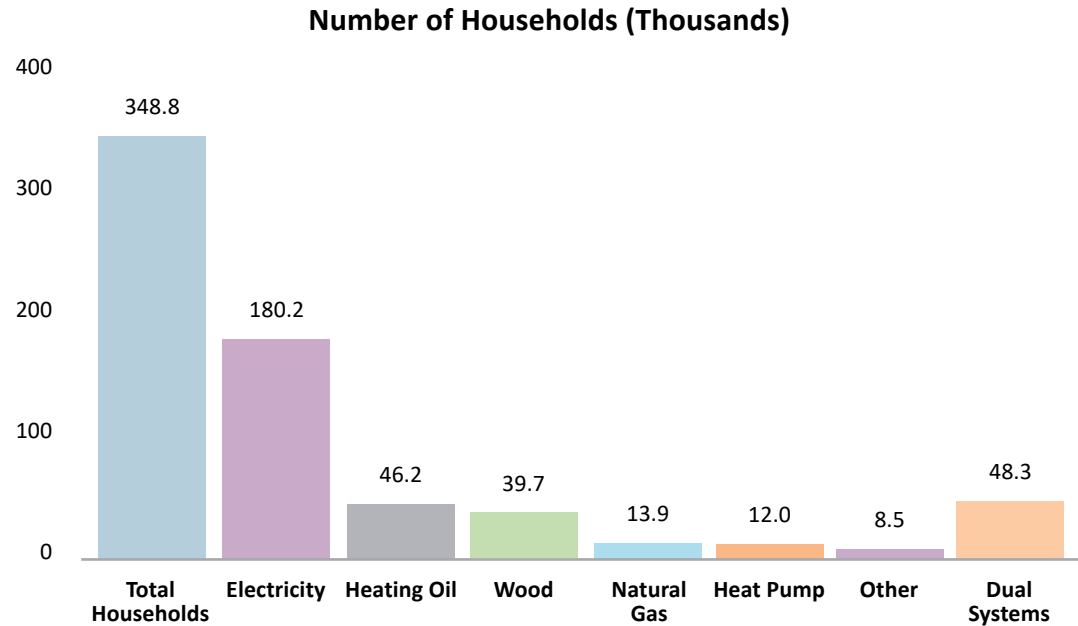
### **We use electricity to power**

- Electric heating for most New Brunswick customers
- Illumination to light the night
- Stovetops to cook our food
- Hot water tanks for laundry and showers
- Appliances for convenience
- Electronics for entertainment
- Smartphones to stay in touch

## How do households heat their homes?

Virtually every household uses electricity to power their electronics and appliances – televisions only run on electricity. But when it comes to heating, there's a number of different fuels households put to use.

As shown in the chart, about 180,000 households heat their homes with electric resistive heating (e.g. baseboard heating), 46,000 heat their homes with heating oil and almost 40,000 heat their homes with wood. Other households use natural gas, heat pumps, other energy sources or a combination to heat their homes.<sup>1</sup>



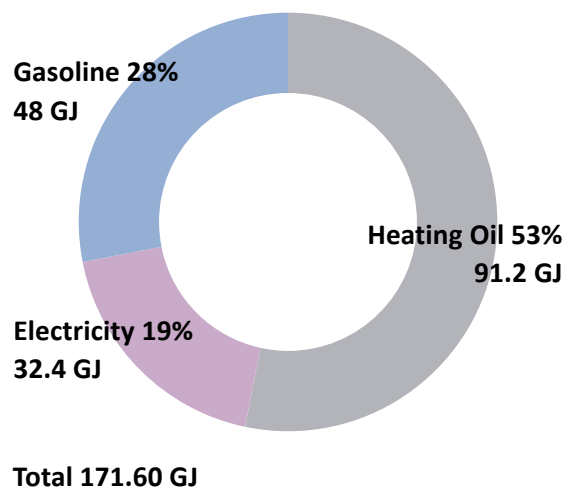
1. NRCan Comprehensive Energy Use Database, New Brunswick, Table 21:  
Heating System Stock by Building Type and Heating System Type  
<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=nb&rn=21&page=0>.

## Energy Use Profiles for households heated by oil and wood pellets<sup>2</sup>

The majority of New Brunswick household energy use is for space and water heating, so how we heat our homes has a big influence on our household energy use profile and household budgets.

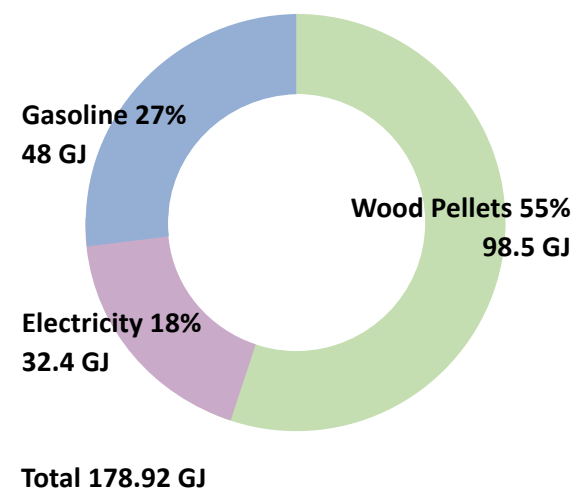
### Heating with Oil:

Over 46,200 New Brunswick households rely on oil to heat their homes. A household with an oil heating system might have an energy use profile matching the pie chart below, with oil providing 53%, electricity 19%, and gasoline 28% of a household's energy.



### Heating with Wood:

Over 39,000 New Brunswick households rely on wood to keep their homes warm.<sup>3</sup> A household heating with wood pellets might have an energy use profile matching the pie chart below, with wood pellets providing 55%, electricity 18%, and gasoline 27% of a household's energy.



2. NRCan Comprehensive Energy Use Database, New Brunswick, Table 21: Heating System Stock by Building Type and Heating System Type  
<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=nb&rn=21&page=0>.

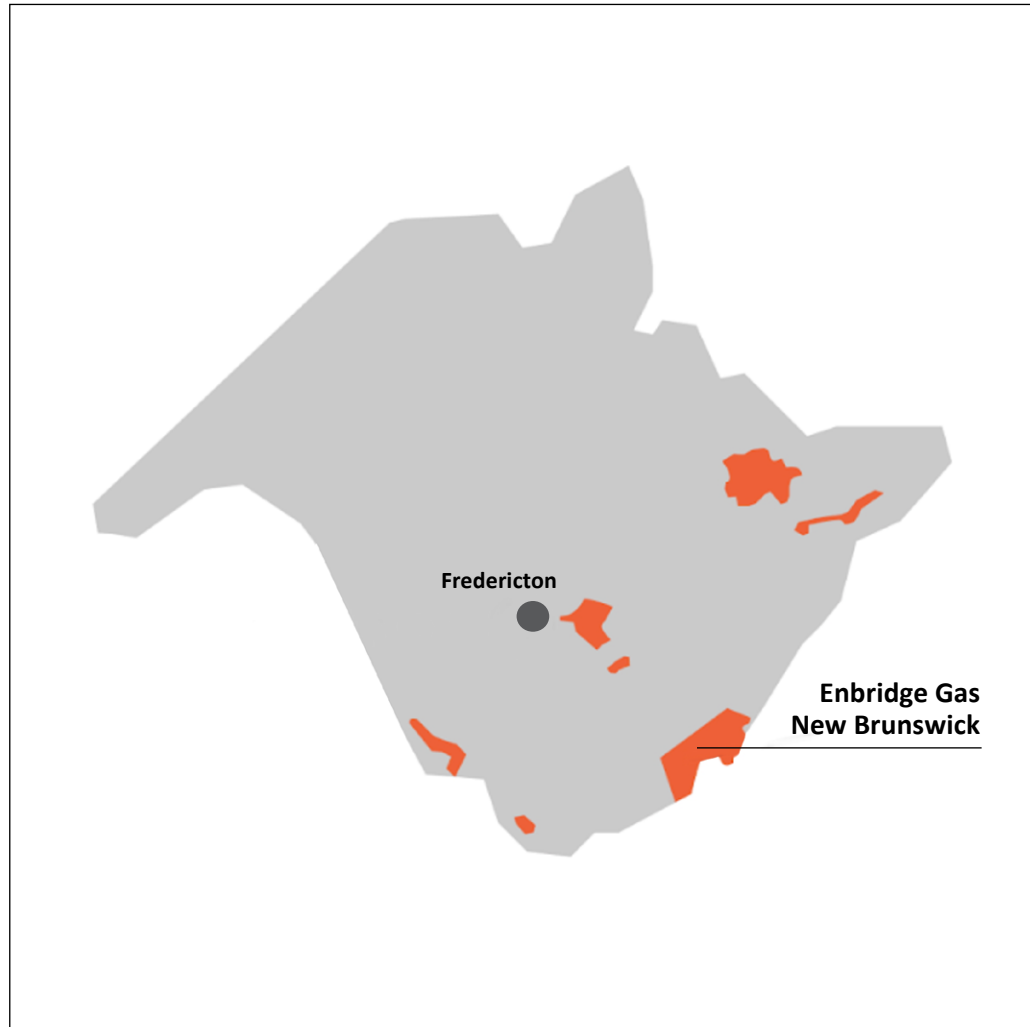
3. Fuel supply for wood heating systems varies widely in terms of energy density and wood quality. To simplify our analysis, we have assumed the use of wood pellets as a fuel stock, operating at 80% efficiency.

## *Which households have natural gas service?*

Although some New Brunswick households heat their homes with natural gas, most do not.

New Brunswick's natural gas distribution system covers some urban areas and rural communities, but most agricultural, low density and small communities do not have natural gas service.

The map of New Brunswick shows municipalities with and without natural gas service.<sup>4</sup>



4. Canadian Gas Association.



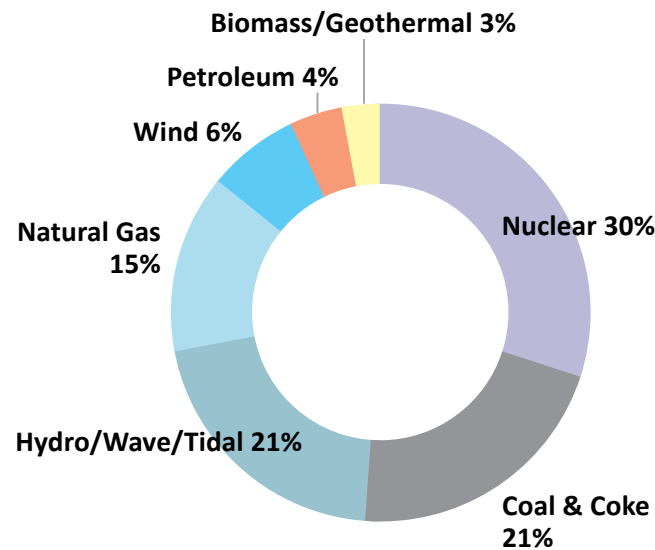
## Where does New Brunswick's electricity (power) come from?

New Brunswick households use electricity that is generated through a variety of sources.

The pie chart shows electricity generation by source in New Brunswick. A total of 15.2 terawatt hours (TWh) of electricity was generated in 2016, with nuclear power generation (uranium) representing the largest share at 30%.<sup>5</sup>

Renewable electricity also represents a significant portion of generation in New Brunswick with hydro, wave and tidal accounting for 21% of total generation. Wind is another 6%.

Traditional fossil fuel sources such as coal & coke, natural gas, and other petroleum products account for 40% of electricity generation.



Nuclear	4.6 TWh or 30%
Coal & Coke	3.2 TWh or 21%
Hydro/Wave/Tidal	3.2 TWh or 21%
Natural Gas	2.3 TWh or 15%
Wind	0.91 TWh or 6%
Petroleum	0.61 TWh or 4%
Biomass/ Geothermal	0.46 TWh or 3%
Total Generation	15.2 TWh

5. See <https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/nb-eng.html>.

## Typical New Brunswick household bills and energy use

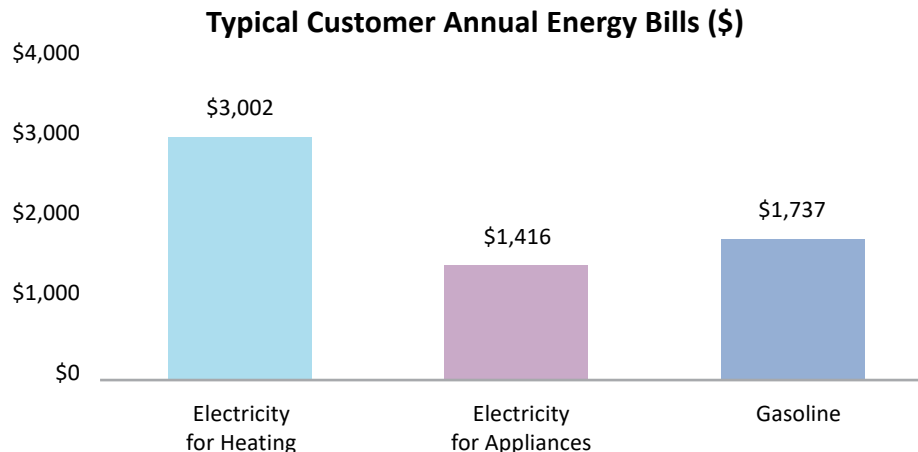
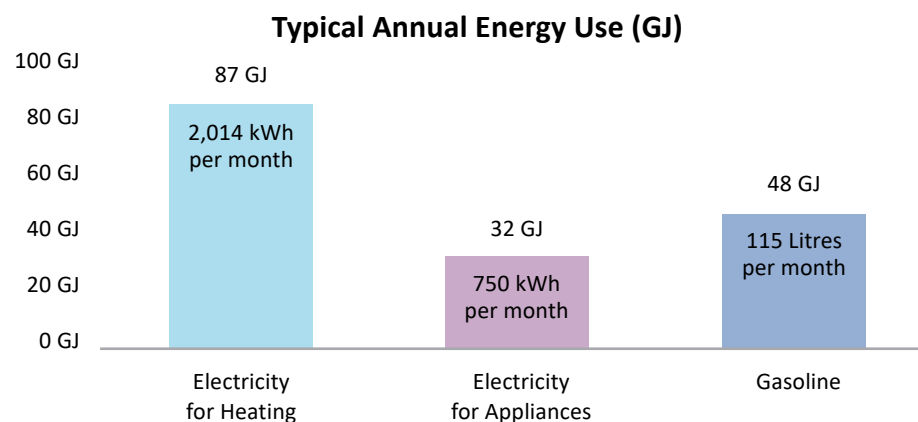
The typical New Brunswick energy consumer uses electricity to heat their home. Here's the breakdown of how much energy a typical household might use every year. This works out to be about 2,014 kilowatt-hours (kWh) of electricity per month for heating, 750 kWh per month for appliances and 115 litres of gasoline a month.

To show them together, we measure the energy used in gigajoules (GJ) per year, a common unit useful for comparing different fuels on an “apples to apples” basis. A gigajoule is equivalent to 1 billion joules, roughly the amount of energy it takes to power a 30 Watt light bulb throughout an entire year.

And here's how much that same typical household might pay for energy every year.

A typical New Brunswick household spends significantly more money on electricity than gasoline, which is in line with energy usage.

These bills have been generated using the rate information on the New Brunswick Power website for a typical New Brunswick customer. Some households will pay more and some will pay less.<sup>6/7</sup>



6. Electricity: New Brunswick Power <https://www.nbpower.com/en/products-services/residential/rates>.

7. Gasoline Costs: See <https://www.nrcan.gc.ca/energy/fuel-prices/4795>.

# The Value of Energy for New Brunswick households

Now that we know how much energy we use and how much we pay for it, we can put together a better picture of the Value of Energy.

The chart shows how much a typical customer pays for each unit of energy – this is the price of energy (in dollars per gigajoule) and helps describe the relative value of different energy sources.

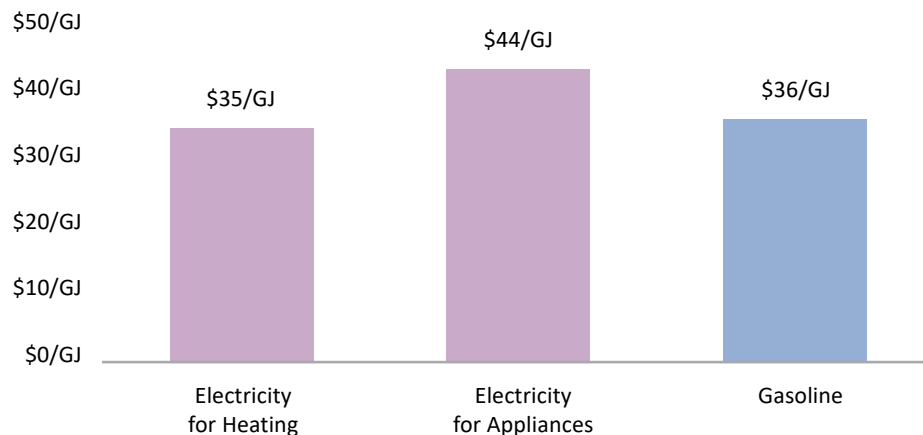
New Brunswick customers will require electricity to power their appliances and illuminate their homes regardless of whether or not they also use electricity for heating. We included monthly services charges with electricity for appliances, which makes the cost per GJ higher than electricity for heating.

Another way to describe the Value of Energy is to show how much energy a household gets for each dollar spent on their energy bill.

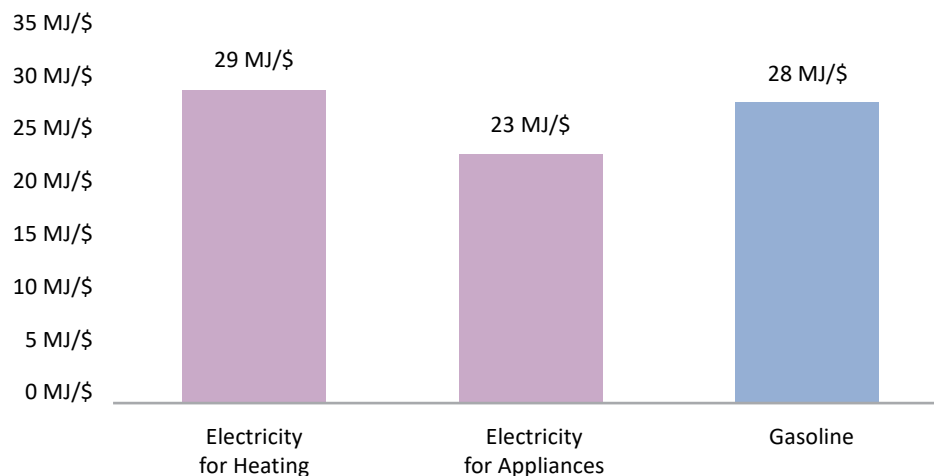
The chart shows the value households get for their energy dollar (in megajoules per dollar).

1 GJ = 1,000 MJ

Price of Each GJ of Energy (\$/GJ)



Energy per Dollar (MJ/\$)

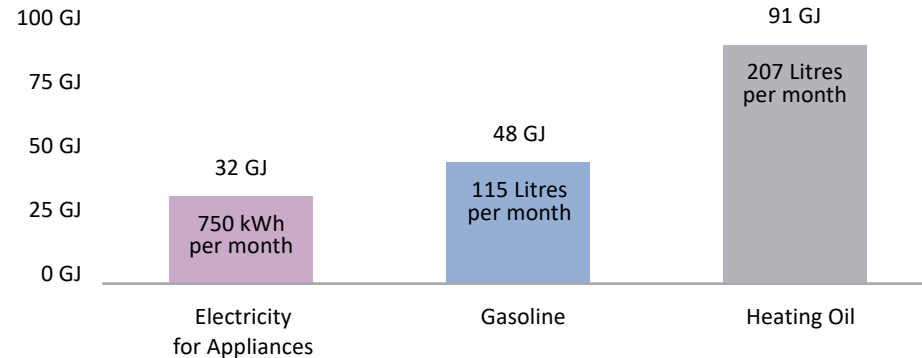


## *A typical bill and household Value of Energy for New Brunswick's 46,000 families that rely on oil for heat*

New Brunswick households that rely on oil for heating consume less electricity than those heating with electric baseboards. Winter months would be higher but on average a household that heats with oil might use about 207 litres of heating oil and 115 litres of gasoline a month.

The charts describe the energy used in terms of gigajoules (GJ), a common unit useful for comparing fuels.

**Annual Energy Use (GJ) - with Heating Oil**

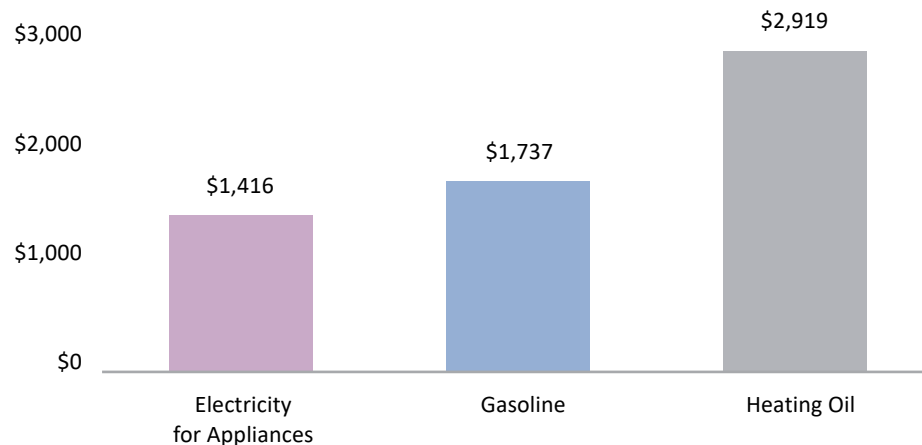


And here's how much a household heating with oil might pay for energy every year.

A New Brunswick household heating with oil would spend a lot on energy bills because heating requires a lot of energy and because the price of heating oil is relatively higher than natural gas.

Heating oil costs about the same as using electricity for household heat.

**Annual Energy Bills (\$) - with Heating Oil**

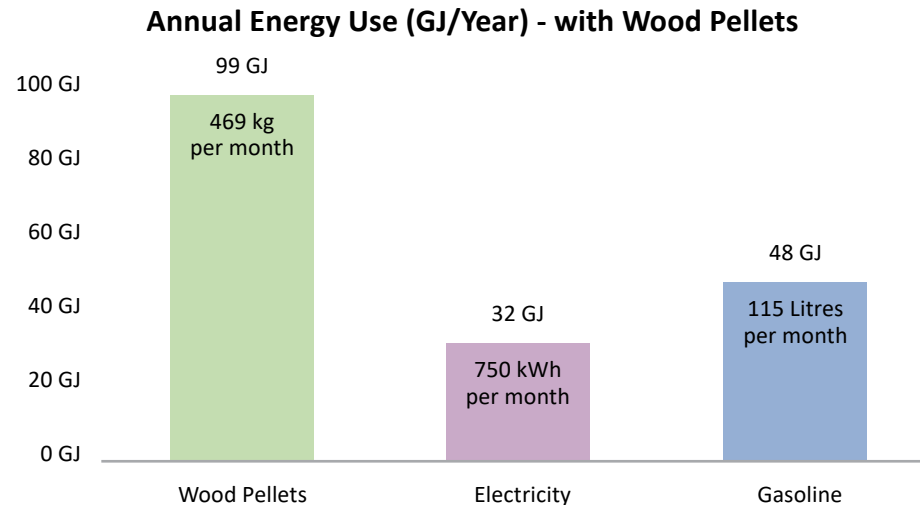


## *A typical bill and household Value of Energy for New Brunswick's 39,700 families that rely on wood for heat*

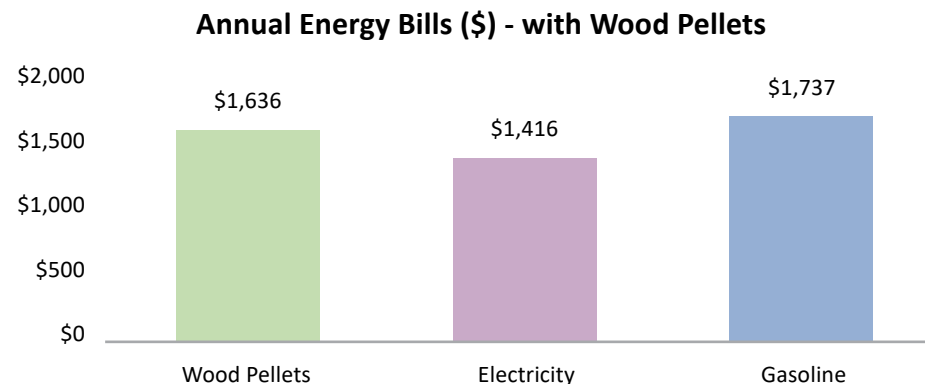
A New Brunswick household that relies on a wood pellets for heat would have a similar looking picture to the typical household that relies on heating oil, except their energy consumption would use wood pellets in place of oil.

A household that uses wood pellets for space and water heating might use an average of about 469 kg of wood pellets for heating, 115 litres of gasoline, and 750 kWh of electricity for appliances each month.

To show them all on the same chart, we've described the energy used in terms of gigajoules (GJ), a common unit useful for comparing fuels.



And here's how much a household that relies on heating pellets might pay per year, considerably less than using electricity or oil for heating. Wood pellet costs have been calculated using timely pricing data and estimated consumption.<sup>8/9</sup>



8. Canadian Wood Pellet Update, Wood Pellet Association of Canada: [https://www.pellet.org/images/2018-06-08\\_GordonMurray.pdf](https://www.pellet.org/images/2018-06-08_GordonMurray.pdf).

9. Note: As of August 2018, The Wood Pellet Association of Canada had only published pricing data for Ontario. Therefore, we have used Ontario wood pellet pricing in the above calculation.

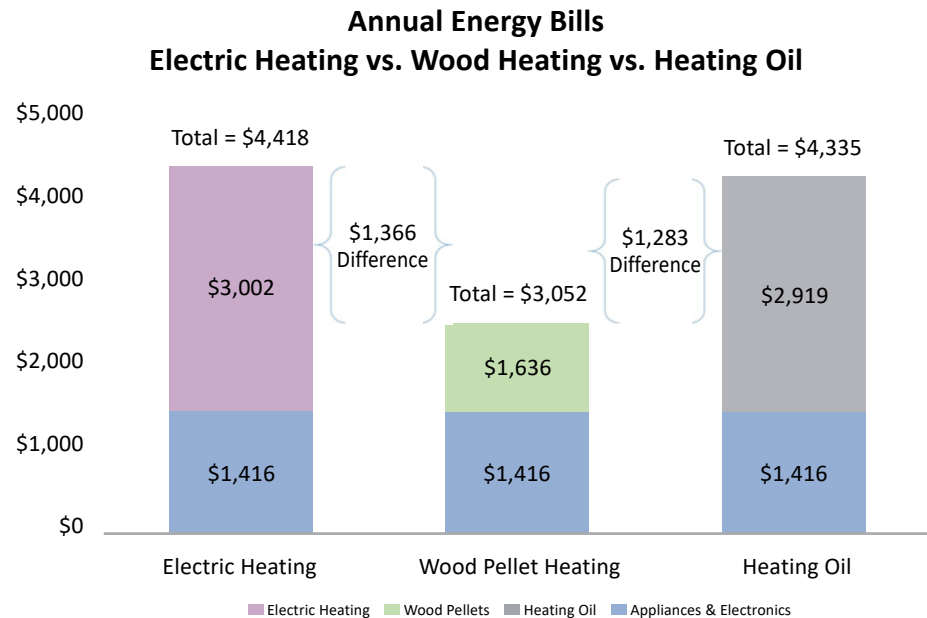
## Comparing the costs of different fuels in New Brunswick

Not everyone has the same breakdown in fuel use as the typical customer. In fact, some households don't use these fuels at all.

As an example, the chart compares three households that use a similar amount of energy: all use electricity for appliances and electronics but they heat their houses differently. One house uses electric baseboards, another uses wood pellets, and the third household uses heating oil in a furnace.

The difference in annual bills between households heated with electricity and wood pellets is over \$1,300 due to the fact that the price of each unit of energy supplied with electricity is much higher than wood pellets.

As heating oil is a marginally cheaper heating source than electricity, the difference between heating with wood pellets and oil is slightly less.



# Value of Energy for different New Brunswick customers

Looking at a typical customer is interesting but to get an even better picture of The Value of Energy, let's take a closer look at how much energy different households use and pay for each month.

To do this, presented below are four New Brunswick customers, representing different demographics and lifestyles, along with a comparison of how much they use and pay for energy.



**Young Urban Single**

Fredericton

Uses less energy and lower bills

- Access to natural gas
- Small condo -> less natural gas
- Fewer devices and appliances -> less electricity
- Compact car and occasional driver -> less gasoline



**Small Town Retirees**

Saint Stephen

Moderate energy use and energy bills

- Heating with electric baseboards
- Medium sized house -> energy from electricity required for heating
- Some devices and appliances -> moderate electricity
- One light truck -> moderate gasoline



**Suburban Family**

Moncton

Uses more energy and higher bills

- Heating with Oil
- Large house -> more heating oil
- More devices and appliances -> more electricity
- Two car commuters -> more gasoline



**Rural Couple**

Waasis

Moderate energy use and high energy bills

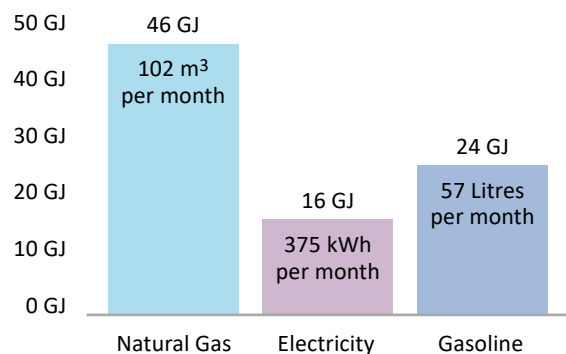
- Heating with wood in medium sized house
- Electricity for devices and appliances -> moderate electricity
- One truck -> more gasoline



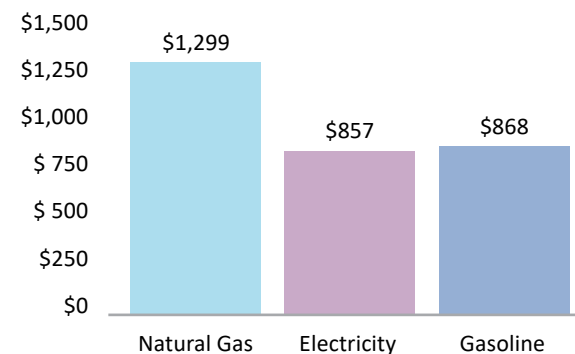
# Value of Energy Customer Snapshot (New Brunswick)

## Young Urban Single

### Annual Energy Use (GJ/year)

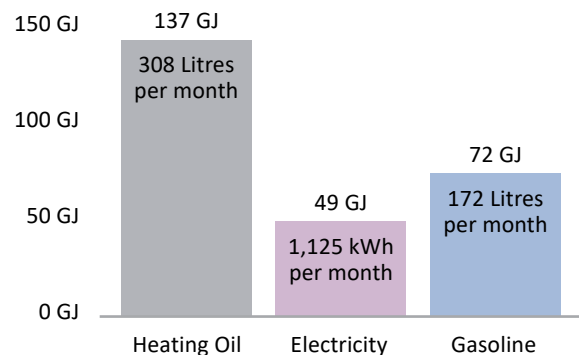


### Annual Energy Bill (\$) Total = \$3,024

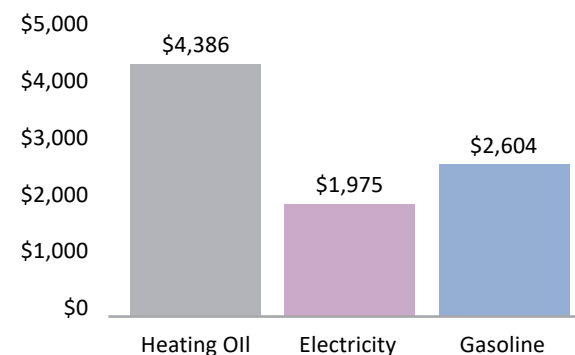


## Suburban Family

### Annual Energy Use (GJ/year)



### Annual Energy Bill (\$) Total = \$8,965

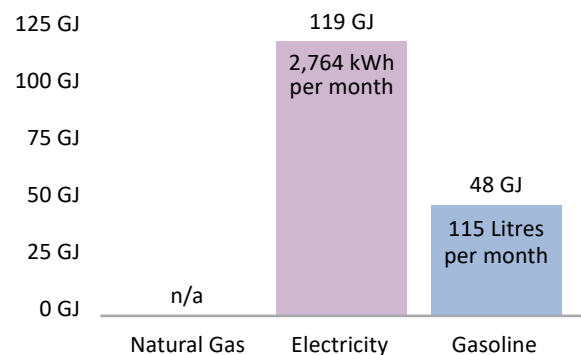




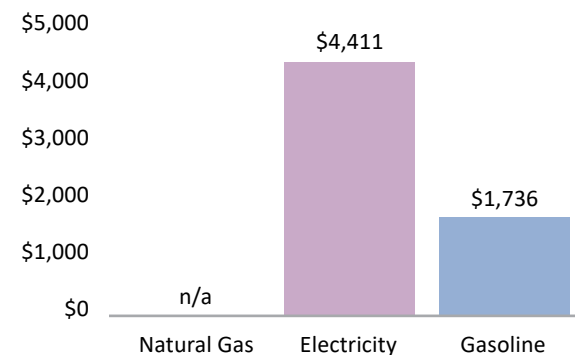
# Value of Energy Customer Snapshot (New Brunswick)

## Small Town Retirees

### Annual Energy Use (GJ/year)

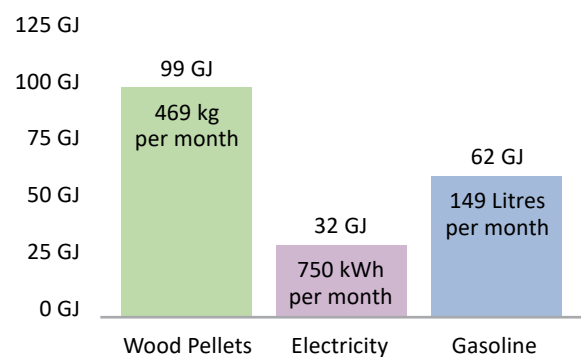


### Annual Energy Bill (\$) Total = \$6,147

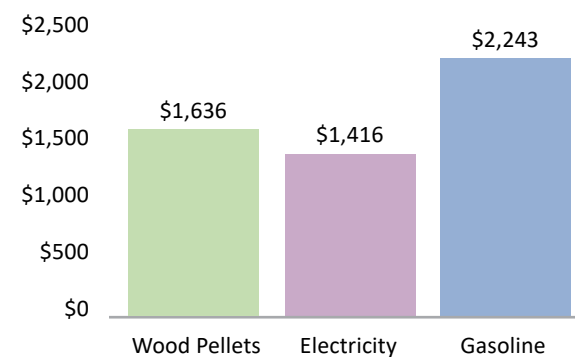


## Rural Couple

### Annual Energy Use (GJ/year)



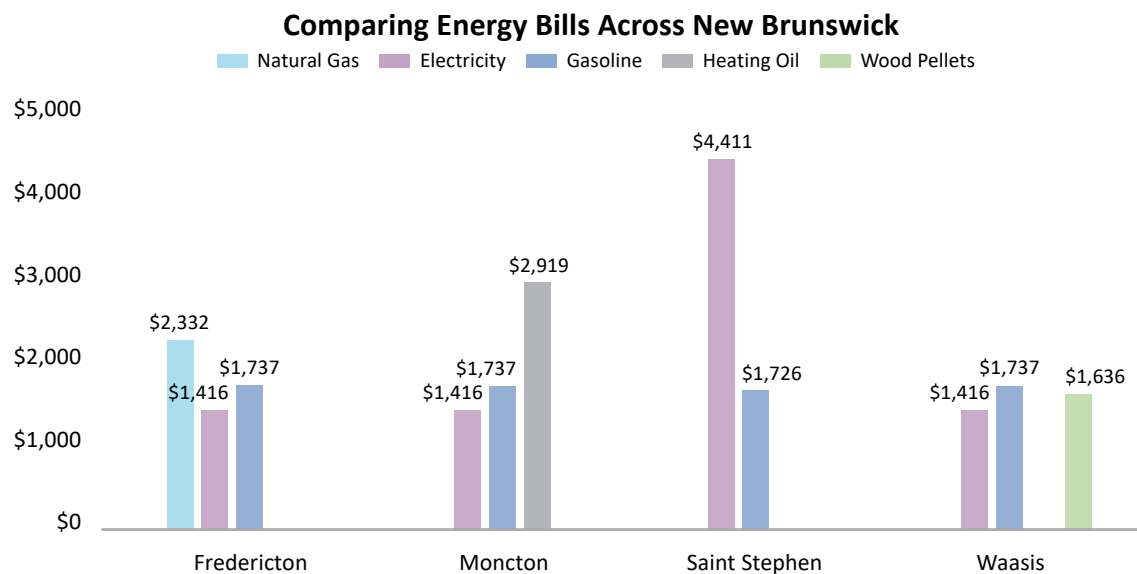
### Annual Energy Bill (\$) Total = \$5,295



## Value of Energy – Location impacts costs

The following chart shows some of the different annual energy costs depending on location.<sup>10/11/12/13/14</sup>

- Electricity in all locations is provided by New Brunswick Power
- Natural gas in Fredericton is provided by Enbridge Gas New Brunswick
- Moncton home heats their home with heating oil
- Saint Stephen home heats with electric baseboards
- Waasis home heats using wood pellets



10. Electricity: See <https://www.nbpower.com/Welcome.aspx?lang=en>.

11. Natural Gas: See <https://naturalgasnb.com/>.

12. Gasoline Costs: See <https://www.nrcan.gc.ca/energy/fuel-prices/4795>.

13. Heating Oil Costs: See <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.7>.

14. Wood Pellet Costs: Wood Pellet Association of Canada: [https://www.pellet.org/images/2018-06-08\\_GordonMurray.pdf](https://www.pellet.org/images/2018-06-08_GordonMurray.pdf).

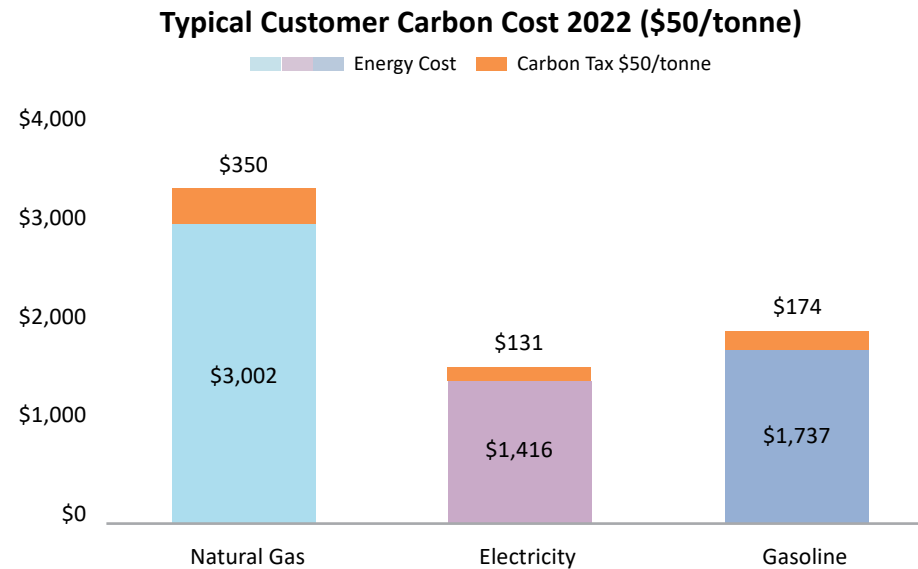
## Impact of a national carbon dioxide emissions tax (aka carbon tax, carbon price)

The federal government has announced that they will be introducing a national price on carbon that will gradually reach \$50/tonne of CO<sub>2</sub> in 2022.

The chart shows the impact of a \$50/tonne tax on carbon in the year 2022 for a typical household in New Brunswick.

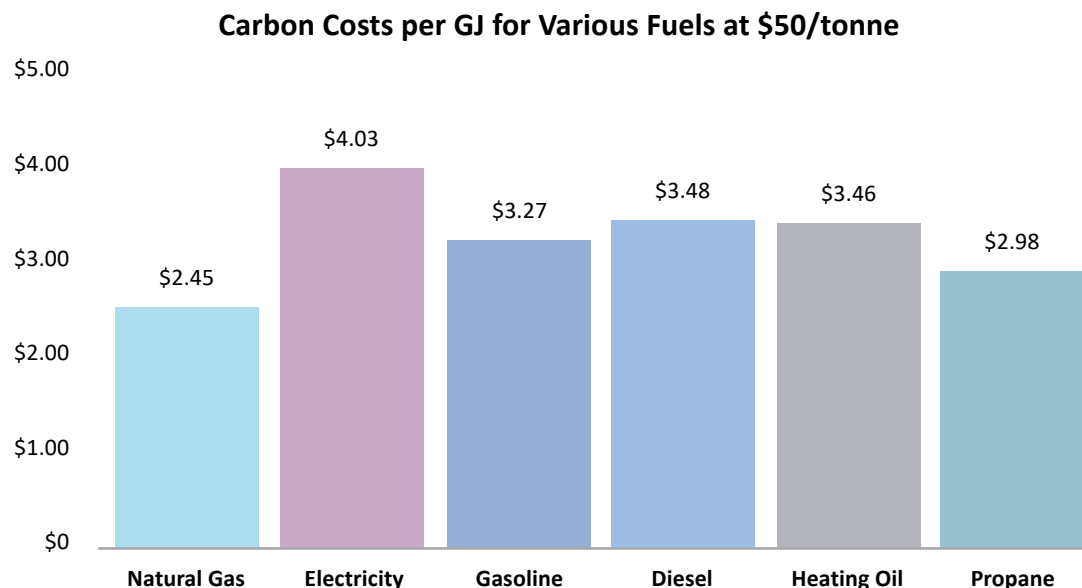
**A \$50 tax on carbon dioxide emissions will increase total electricity costs by 11% and gasoline by 10%.**

Note: The energy prices in this chart assumes constant commodity prices.



## Carbon dioxide emissions costs for different fuels<sup>15</sup>

Fuels vary in their energy and carbon dioxide content. For example, burning a Litre of gasoline will produce a different amount of energy and CO<sub>2</sub> emissions when compared to burning a cubic metre of natural gas. In order to compare carbon costs, the following chart normalizes the most popular fuels on an energy-equivalent basis – that is carbon dioxide content per gigajoule (GJ) and multiplies this by a carbon tax/price of \$50/tonne of CO<sub>2</sub>.



15. Environment and Climate Change Canada, National Inventory Report, Greenhouse Gas Sources and Sinks in Canada: See <http://www.publications.gc.ca/site/eng/9.506002/publication.html>.

## Conclusion

It should now be apparent that energy comes from a variety of sources, and households consume energy from different sources. Energy prices vary based on geography as well as the type of energy that is available or used. Of New Brunswick's 348,800 households, about 180,200 homes rely on electric baseboards, and 46,200 use heating oil. The rest use wood, natural gas, propane or some combination for heat.

Household budgets are affected by their energy use. New Brunswick families using electricity or heating oil pay roughly the same for home heating.

Typical New Brunswick households that rely on electricity for heating and appliances as well as electronics pay \$4,418 a year for energy. Those that use heating oil and electricity for appliances typically pay \$4,335. And households that use wood pellets for heat spend \$3,052 each year on all energy use. Natural gas is available only in select areas and used by fewer than 14,000 households.

Not everyone has the same breakdown in fuel use as the typical customer, but these figures demonstrate the variances within New Brunswick.

Government energy policymakers have a significant impact on household energy budgets. Changes to the province's energy infrastructure and mix should be done prudently since decisions made today will have lasting consequences on the supply of energy and its long-term affordability.

The public is concerned about climate change and addressing this challenge requires lawmakers to be honest about mitigation costs and the impact of policies on household budgets and businesses. If we hope to maintain our high quality of life, an all electrical or all renewable energy future remains, at best, an aspirational goal in a distant future. Questioning government policies that could negatively impact Canadians does not make the examiner a climate skeptic, merely a responsible and concerned citizen.

The starting point to any discussion on energy policy begins with measurable facts, which this report hopes to provide and give readers an understanding of the energy landscape in New Brunswick.



## **New Brunswick Household Research Report**

### **Contact**

Address: P.O. Box 3923, Saint Andrews, New Brunswick, E5B 3S7

Website: [www.AffordableEnergy.ca](http://www.AffordableEnergy.ca)

Email: [info@AffordableEnergy.ca](mailto:info@AffordableEnergy.ca)

Facebook: <https://www.facebook.com/canadiansforaffordableenergy/>