Canadians for Affordable Energy

The Value of Energy – Prince Edward Island

Canadians for Affordable Energy: Household Research Series

JUNE 2019

Canadians for
Affordable Energy

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 – Prince Edward Island Notes

The energy price and cost data contained in this Prince Edward Island Household Research Report are approximate and represent how much residential customers might pay for various energy products, using timely data from credible sources, including the Prince Edward Island Regulatory and Appeals Commission, Maritime Electric for electricity, Natural Resources Canada for gasoline prices, Wood Pellet Association of Canada for wood pellet prices, and Statistics Canada for furnace oil prices.

Maritime Electric is Prince Edward Island's only electric utility and all residential customers pay the same rate. The province does not have natural gas service.

PEI's domestic electricity is predominantly (98%) generated through wind, however, the province imports the majority (70%) of electricity used from New Brunswick. New Brunswick generates electricity primarily through fossil fuels, nuclear, and hydropower. As a result, the electricity that is used in PEI households still produces greenhouse gases (GHG). However, tracking each kWh and resulting GHGs from the imported electricity can get quite complicated and so the GHGs reported on pages 18-19 of this report are associated with PEI's domestic electricity generation only.

Contact

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

Website: www.affordableenergy.ca
Email: info@affordableenergy.ca
Facebook: https://www.facebook.com/canadiansforaffordableenergy/

LES
LASZLO ENERGY SERVICES

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.

Summary

The federal government's carbon pricing program (aka carbon dioxide emissions tax or carbon tax) is set to have a major impact on the pocketbook of Prince Edward Island energy consumers: families and businesses.

Over 65 percent of Prince Edward Island homes use oil for heating. If a federal carbon tax of $50/tonne is imposed, those heating oil costs would increase by 15 percent. The federal carbon tax could also increase gasoline costs by 10 percent. PEI imports a significant proportion of electricity from New Brunswick, and therefore it is challenging to assess what the impact of a $50/tonne carbon tax will be on those electricity prices. However, considering only PEI's domestic electricity generation, a $50/tonne carbon tax could increase electricity costs by less than 1 percent.

The increase in heating oil costs is of particular concern because oil accounts for 40 percent of a typical household's energy expenses. Gasoline and electricity each account for 30 percent of energy spending.

Heating with wood pellets is the lowest operating cost option for Prince Edward Island families. A household heating with wood pellets might spend $3,470 on energy annually, not including gasoline. The same customer heating with electric resistive heating might spend $5,836. Households heating with oil – representing over 65 percent of Prince Edward Island homes – might spend $4,363.

The carbon content of heating oil is very high relative to Prince Edward Island's domestically generated electricity, therefore the impact of carbon pricing on oil will be larger.

Government energy policymakers have a significant impact on household energy budgets. Changes to Prince Edward Island'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 Prince Edward Island's ratepayers relying heavily on heating oil for their energy needs and significant power from neighbouring New Brunswick, it's important that governments recognize this and ensure 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 Prince Edward Island 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 Maritime Electric, Natural Resources Canada and Statistics Canada.

To give us an idea of The Value of Energy, let's look at Prince Edward Island's energy uses

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

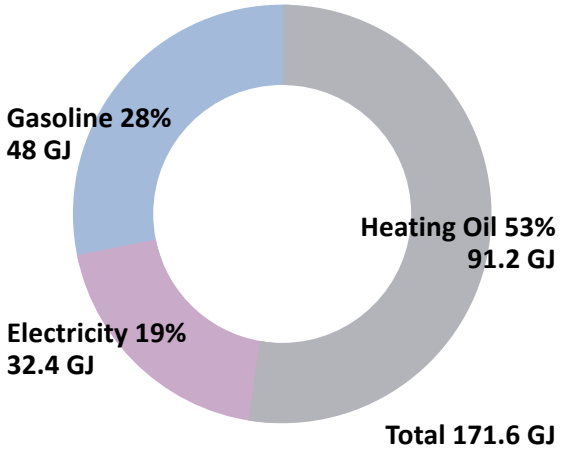
- Heating Oil provides 53%
- Electricity provides 19%
- Gasoline provides 28%

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

Approximately 42,000 PEI households, over 65% of all homes, use oil for heating. The remaining homes rely on wood, electricity, heat pumps, 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 heating oil to fuel

- Home furnace
- Hot water tanks for laundry and showers

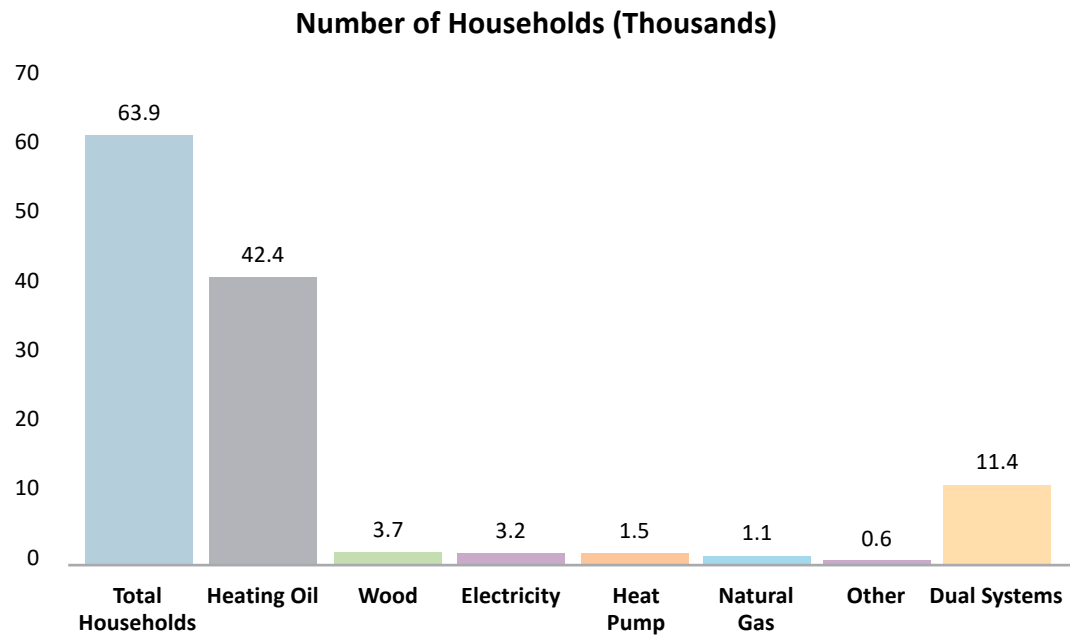
We use electricity to power

- Illumination to light the night
- Appliances for convenience
- Stovetops to cook our food
- 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 42,400 households heat their homes with oil, 3,700 use wood, and 3,200 use electric resistive heating (e.g. baseboard heating). Other households use heat pumps, or other energy sources to heat their homes.[1]



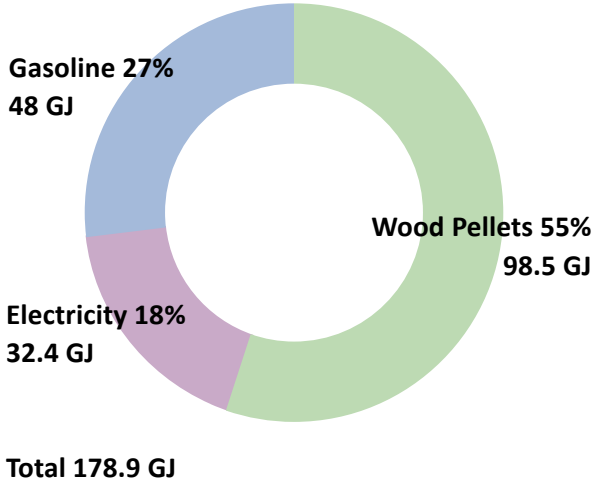
1. NRCan Comprehensive Energy Use Database, Nova Scotia, Table 21: Heating System Stock by Building Type and Heating System Type http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=pei&rn=21&page=0.

Other Energy Use Profiles for households heated with wood pellets and electricity[2]

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

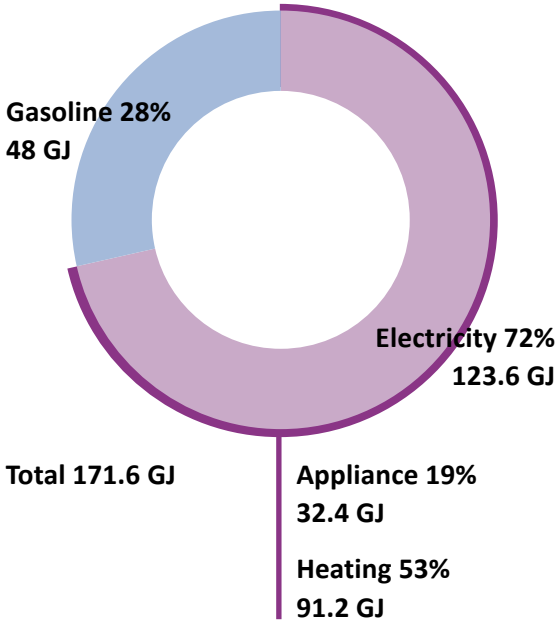
Heating with Wood:

About 3,700 Prince Edward Island households rely on wood to keep their houses warm.[3] 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.



Heating with Electricity:

3,200 Prince Edward Island households rely on electricity to both heat their homes and power appliances. A household with baseboard electric heating might have an energy use profile matching the pie chart below with electricity providing 72% and gasoline 28% of a household's energy.



2. NRCan Comprehensive Energy Use Database, Nova Scotia, 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=nf&rn=21&page=0.

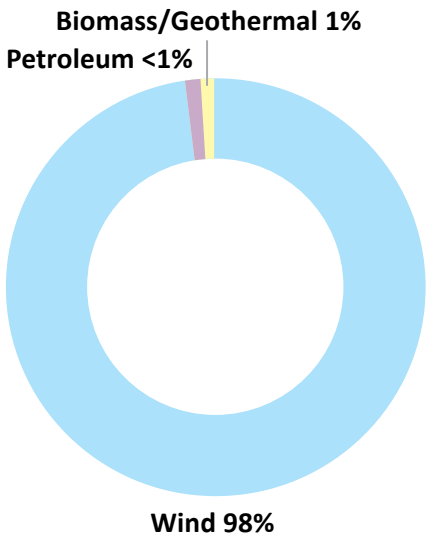
3. Fuel supply for wood heating systems varies widely in terms of energy density and wood quality. To simplify our analysis, we have assumed the use of wood pellets as a fuel stock, operating at 80% efficiency.

Where does Prince Edward Island's electricity (power) come from?

PEI households use electricity primarily imported from New Brunswick, which is generated through a mix of nuclear, fossil fuels and hydropower. In 2016, PEI imported roughly 70% of electricity used.

The pie chart shows PEI domestic electricity generation by source. A total of 1.14 terawatt hours (TWh) of electricity was generated in 2016, representing 0.1% of total Canadian generation. Wind represents 98% of PEI's electricity generation.[4]

The remainder is generated through the combustion of fossil fuels and other renewable sources, such as biomass and geothermal.



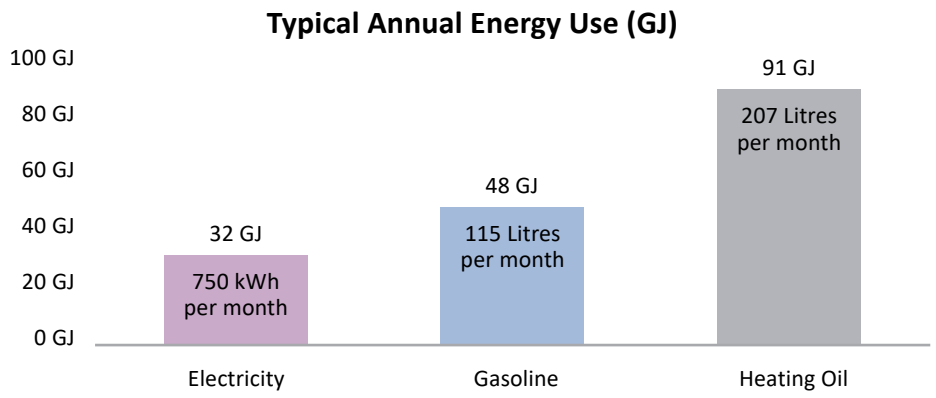
Wind	1.1 TWh or 98%
Petroleum	0.006 TWh or <1%
Biomass/Geothermal	0.037 TWh or 1%
Total Generation	1.143 TWh

4. See https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/pe-eng.html.

Typical Prince Edward Island household bills and energy use

The typical Prince Edward Island household uses oil to heat their home. Here's the breakdown of how much energy a typical PEI household might use every year. This works out to be about 207 litres of heating oil, 750 kWh of electricity, and 115 litres of gasoline a month.

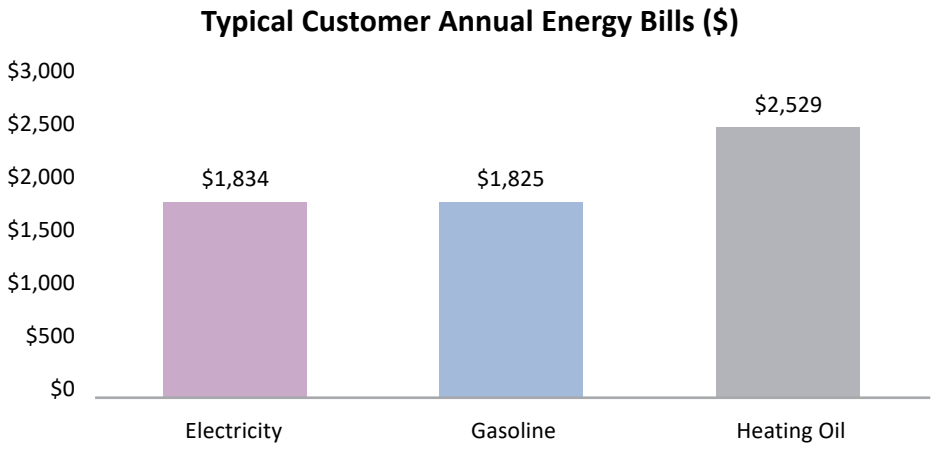
To show them together, we measure the energy used in terms of gigajoules (GJ) per year, a common unit useful for comparing fuels on an "apples to apples" basis. A gigajoule is equivalent to 1 billion joules, roughly the amount of energy it takes to power a 30 Watt light bulb throughout an entire year.



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

A typical Prince Edward Island 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 Maritime Electric website for a typical Prince Edward Island customer. Some households will pay more and some will pay less.[5/6/7]

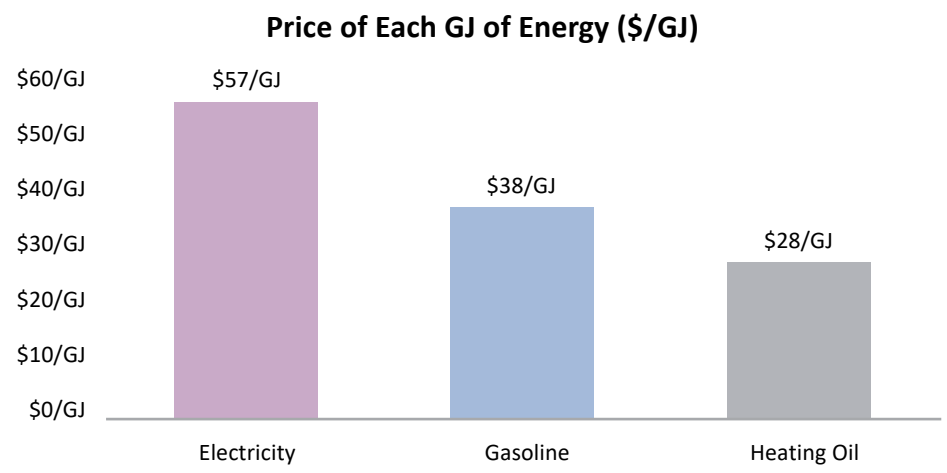


5. Electricity: Maritime Electric https://www.maritimeelectric.com/.
6. Gasoline Costs: See https://www.nrcan.gc.ca/energy/fuel-prices/4795.
7. Heating Oil Costs: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.7.

The Value of Energy for Prince Edward Island 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.

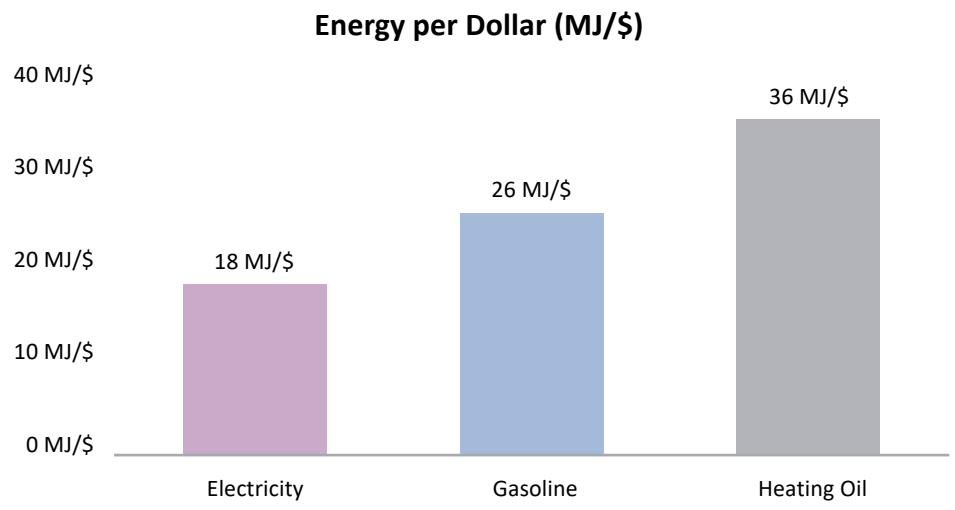
The chart shows how much a typical customer pays for each unit of energy – this is the price of energy (in dollars per gigajoule) and helps describe the relative value of different energy sources.



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



A typical bill and household Value of Energy for Prince Edward Island's 3,700 families that rely on wood for heat

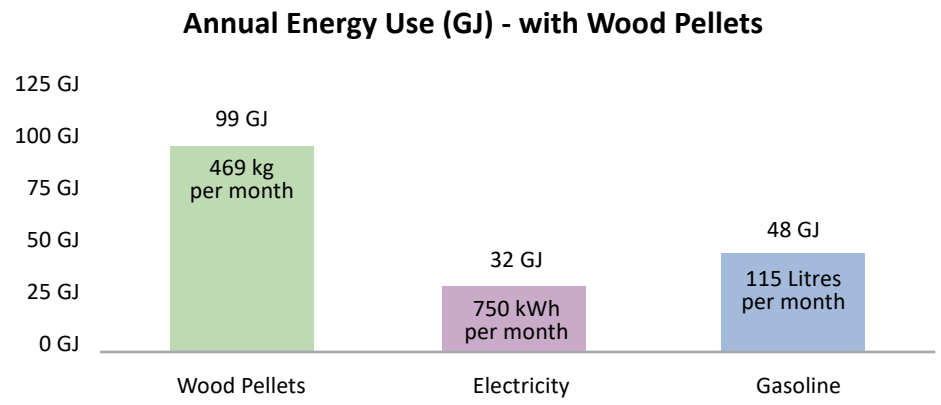
A Prince Edward Island household that relies on a wood pellets for heat would have a similar looking picture to the typical household that relies on heating oil, except their energy consumption would use wood pellets in place of oil.

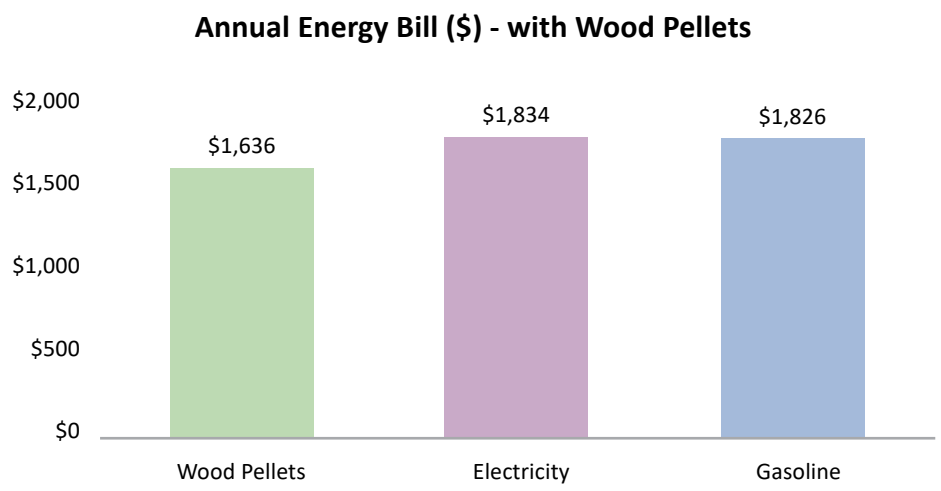
A household that uses wood pellets for space and water heating might use an average of about 469 kg of wood pellets for heating, 115 litres of gasoline, and 750 kWh of electricity for appliances each month.

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.

Wood pellet costs have been calculated using timely pricing data and estimated consumption.[8/9]



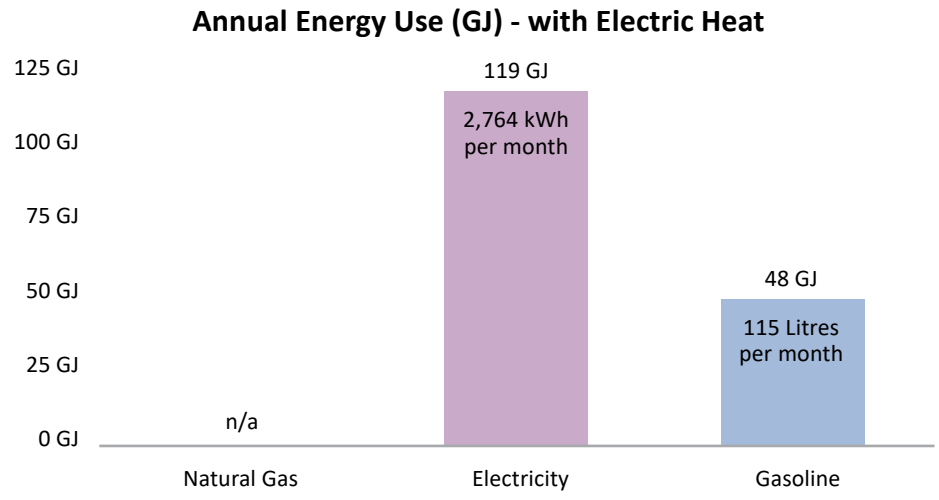


8. Canadian Wood Pellet Update, Wood Pellet Association of Canada: https://www.pellet.org/images/2018-06-08_GordonMurray.pdf.
9. Note: As of August 2018, The Wood Pellet Association of Canada had only published pricing data for Ontario. Therefore, we have used Ontario wood pellet pricing in the above calculation.

A typical bill and household Value of Energy for Prince Edward Island's 3,200 families that rely on electricity for heat

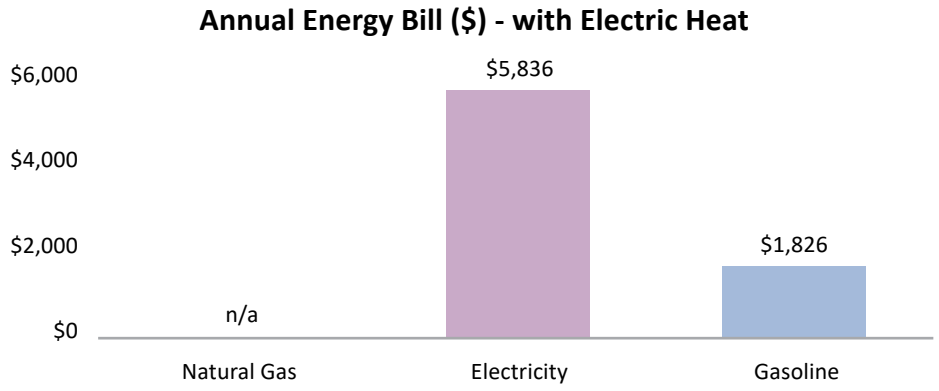
PEI households that rely on baseboard electricity for heating consume a lot of electricity compared to those that heat with heating oil or other fuels. Winter months would be higher but on average a household that heats with electricity might use about 2,764 kWh of electricity and 115 litres of gasoline a month.

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



And here's how much a household that relies on electric heating might pay for energy per year.

Electricity costs are calculated based on electricity consumption and rates.



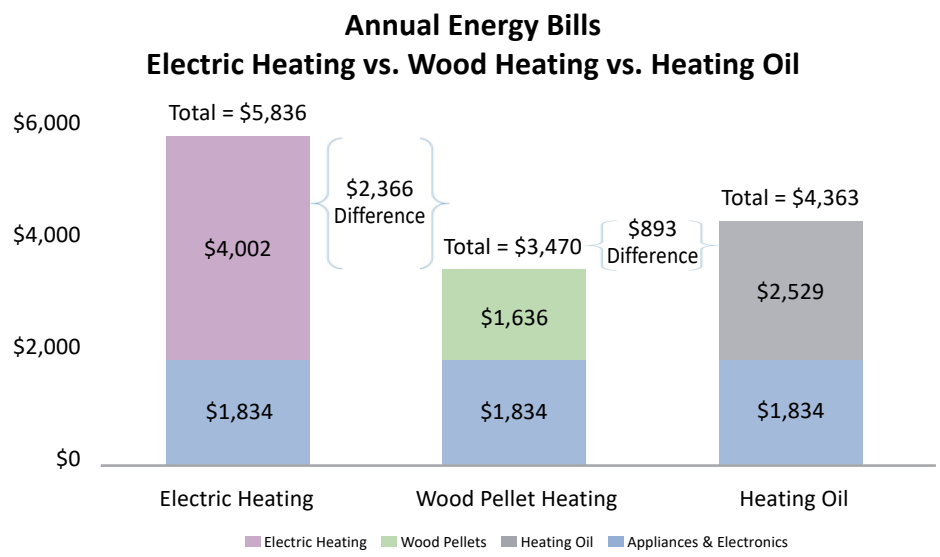
Comparing the costs of different fuels in Prince Edward Island

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.

The difference in annual bills between the households heated with electricity and wood pellets is $2,366 due to the fact that the price of each unit of energy supplied with electricity is much higher than wood pellets.

Heating oil is a cheaper heating source than electricity, but more expensive than wood pellets. The difference between heating with wood pellets and oil is almost $900.



Value of Energy for different Prince Edward Island 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 PEI customers, representing different demographics and lifestyles, along with a comparison of how much they use and pay for energy.

Young Urban Single

Charlottetown

Uses less energy and has lower bills

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

Suburban Family

Stratford

Uses more energy and has higher bills

- Large house -> more furnace oil
- More devices and appliances -> more electricity
- Two car commuters -> more gasoline

Small Town Retirees

O'Leary

Moderate energy use and energy bills

- Moderate heating oil
- Some devices and appliances -> moderate electricity
- One light truck -> moderate gasoline

Rural Couple

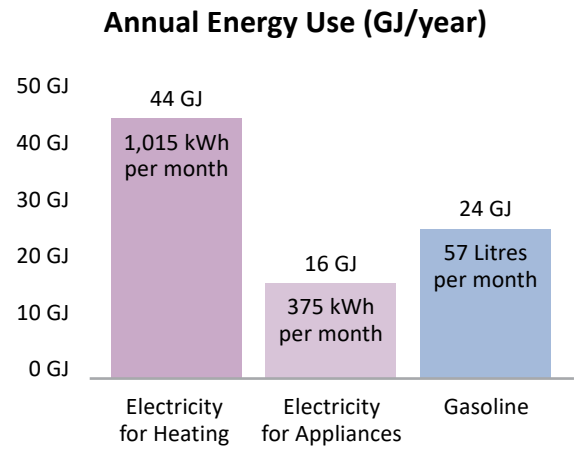
Coleman

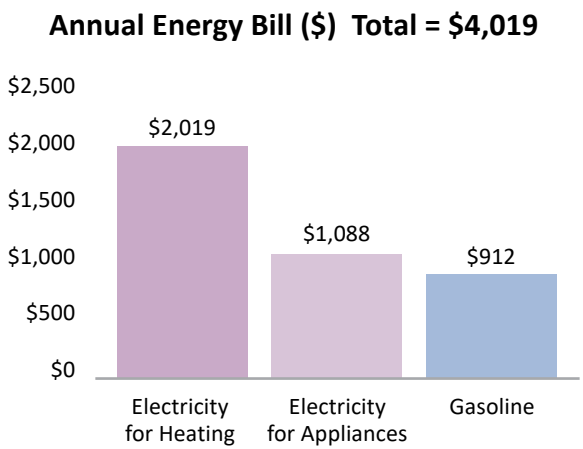
Moderate energy use and has higher energy bills

- Heating with wood pellets
- Electric heating with some devices and appliances -> high electricity
- One truck -> more gasoline

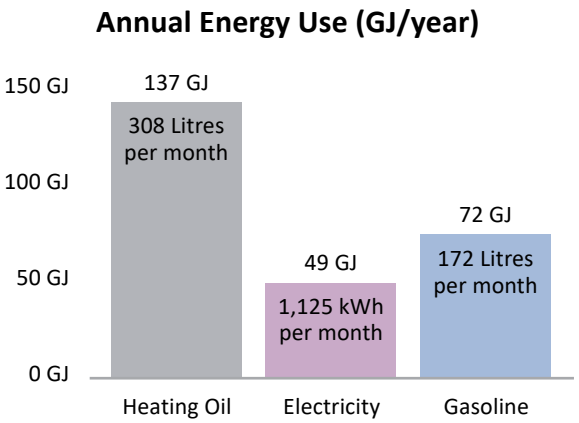
Value of Energy Customer Snapshot (Prince Edward Island)

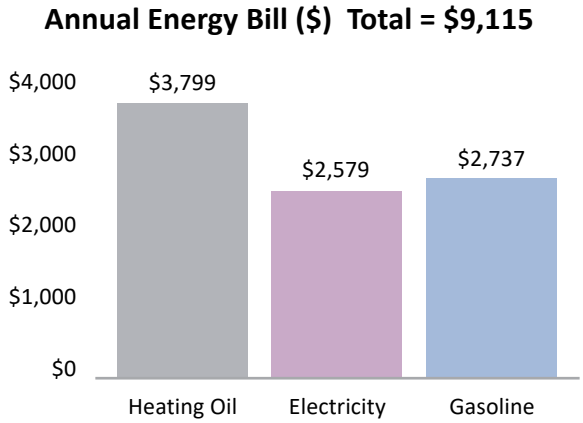
Young Urban Single





Suburban Family

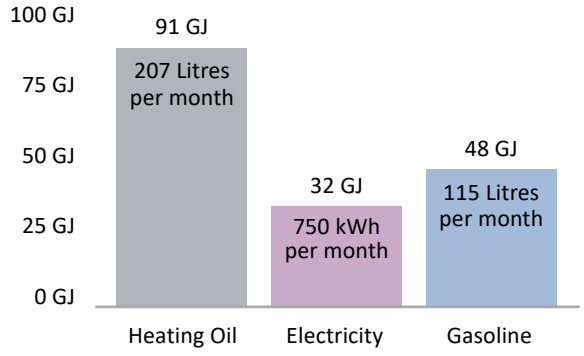




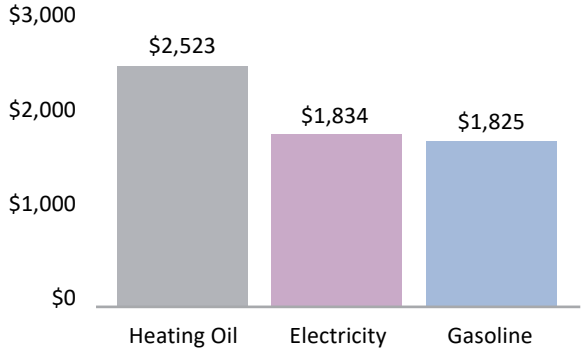
Value of Energy Customer Snapshot (Prince Edward Island)

Small Town Retirees

Annual Energy Use (GJ/year)

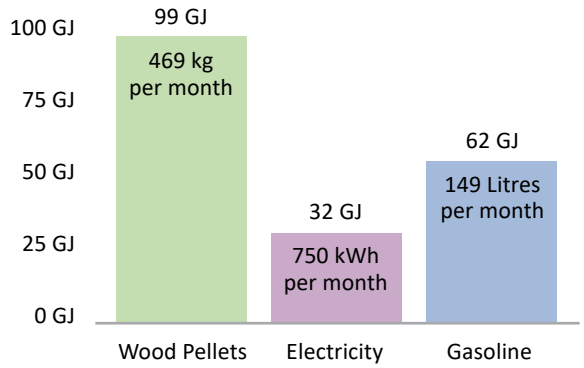


Annual Energy Bill ($) Total = $6,182

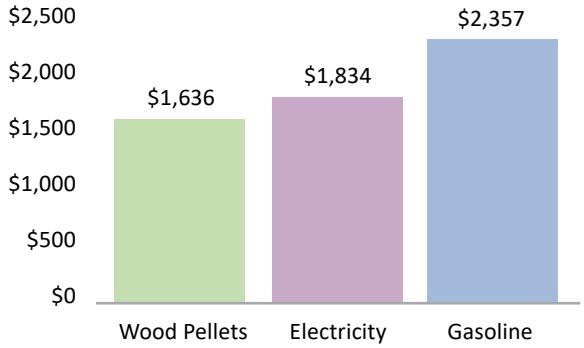


Rural Couple

Annual Energy Use (GJ/year)



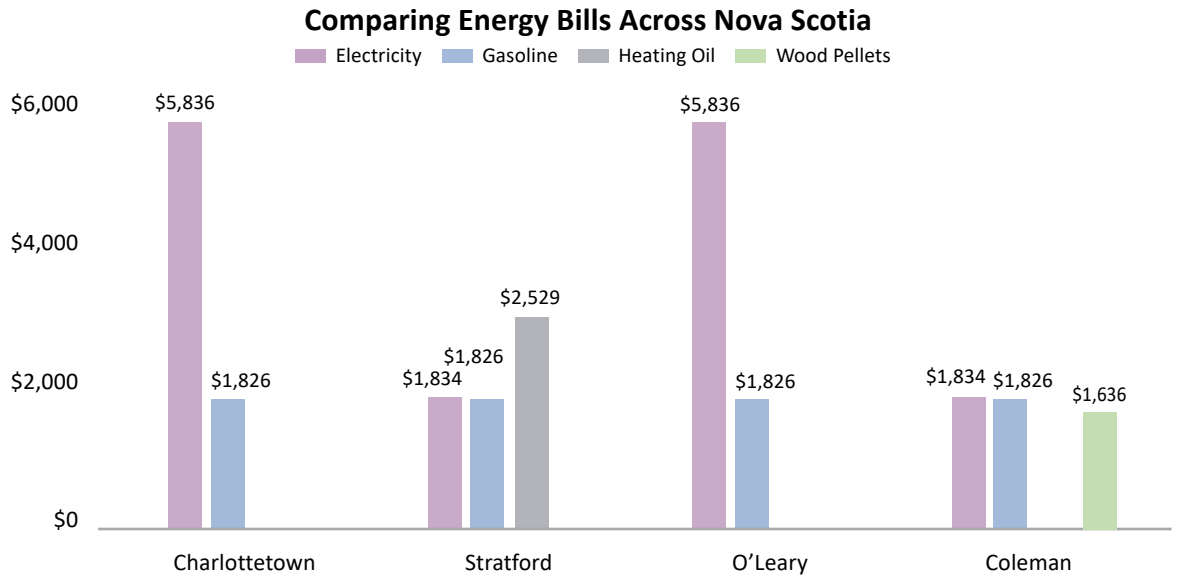
Annual Energy Bill ($) Total = $5,827



Value of Energy – Location impacts costs

The following chart shows some of the different annual energy costs depending on location.[10/11/12/13]

- Electricity in all locations is provided by Maritime Electric
- Charlotte and O'Leary residents heat their homes with electricity
- Stratford resident heats with oil
- Coleman resident heats with wood pellets



10. Electricity: See https://www.maritimeelectric.com/.
11. Gasoline Costs: See https://www.nrcan.gc.ca/energy/fuel-prices/4795.
12. Heating Oil Costs: See https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.7.
13. Wood Pellet: Wood Pellet Association of Canada: https://www.pellet.org/images/2018-06-08_GordonMurray.pdf.

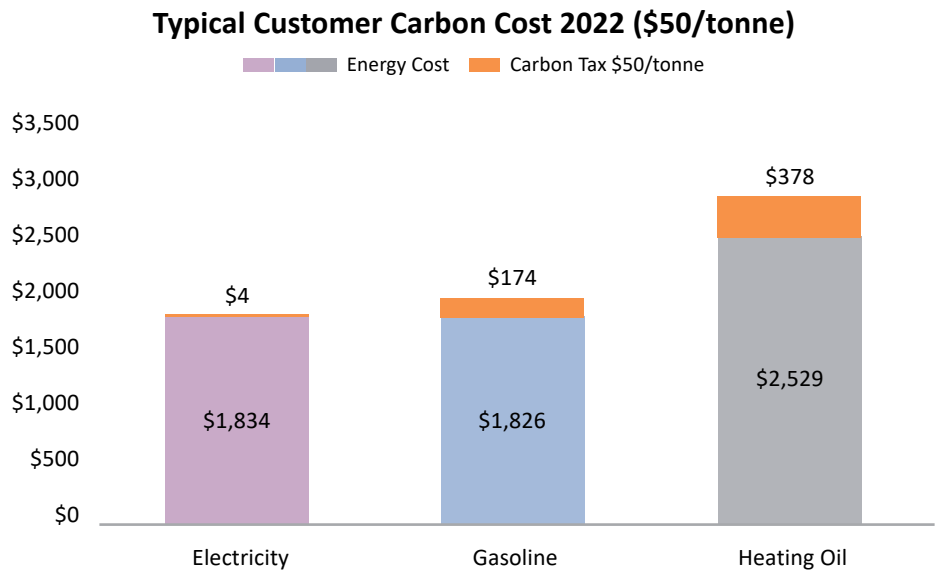
Impact of a national carbon dioxide emissions tax (aka carbon tax, carbon price)

The federal government has announced that they will be introducing a national price on carbon that will gradually reach $50/tonne of CO_2 in 2022.

The chart shows the impact of a $50/tonne tax on carbon in the year 2022 for a typical PEI household heating with oil.

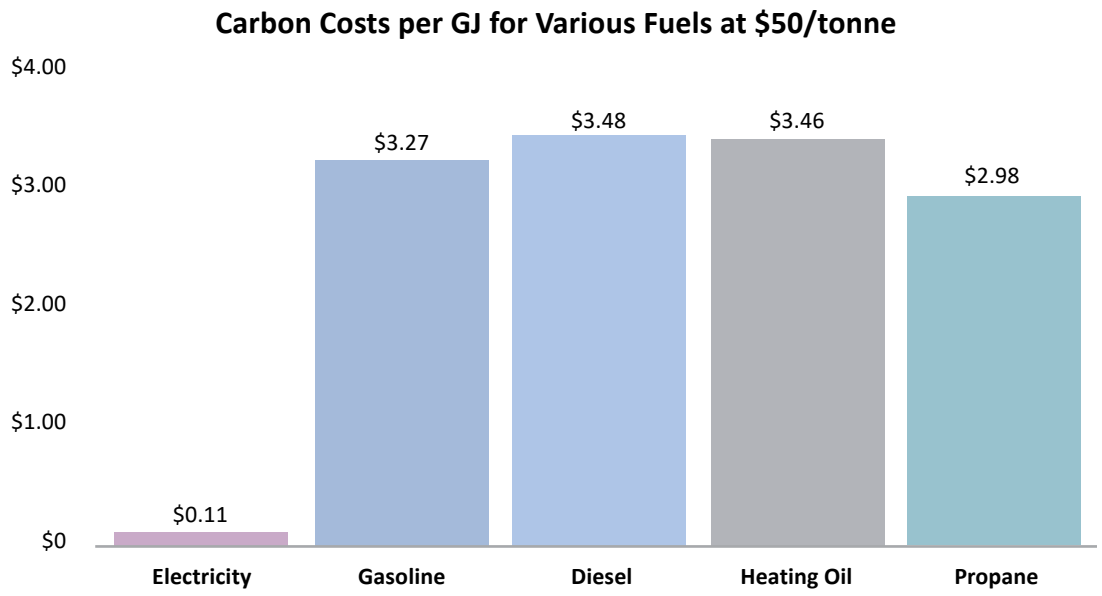
A $50 tax on carbon dioxide emissions will increase PEI produced electricity costs by 0.2%, gasoline by 10% and heating oil by 15%.

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



Carbon dioxide emissions costs for different fuels[14]

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_2 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_2.



14. 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 difference sources. Energy prices vary based on geography as well as the type of energy that is available or used. Of Prince Edward Island's 64,000 households, about 42,400 heat their homes with oil, 3,700 use wood and 3,200 homes rely on electric baseboards. The rest use heat pumps, natural gas or some combination for heat.

Household budgets are affected by their energy use. Prince Edward Island families with the lowest energy prices have access to heating oil or wood pellets.

Typical PEI households that rely on electricity for heating and appliances as well as electronics pay $5,836 a year for energy. Those that use heating oil and electricity for appliances – representing 66% of provincial homes – typically pay $4,363. And households that use wood pellets spend $3,470 each year on all energy use.

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

Government energy policymakers have a significant impact on household energy budgets. Changes to PEI'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 polices 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 Prince Edward Island.

Canadians for Affordable Energy

Prince Edward Island Household Research Report

Contact

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

Website: www.AffordableEnergy.ca

Email: info@AffordableEnergy.ca

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