Canadians for Affordable Energy

The Value of Energy – Manitoba

Canadians for Affordable Energy: Household Research Series

MARCH 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 – Manitoba Notes

The energy price and cost data contained in this Manitoba 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 Manitoba Utilities Commission, Manitoba Hydro for electricity and natural gas, Natural Resources Canada for heat pump data, and Natural Resources Canada for gasoline prices. Manitoba Hydro is the only electricity and natural gas utility in the province and all customers pay the same price, where available.

Energy price and cost data include the federal government's carbon dioxide emissions tax – effective April 1, 2019 – set at $20 per tonne of carbon dioxide equivalent emissions. The tax rate will increase each year by $10 per tonne until it reaches $50 per tonne in 2022.

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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 is set to impose a carbon dioxide emissions tax (carbon tax) on Manitoba that will start at $20 a tonne on April 1, 2019, and increase to $50 per tonne in 2022. This tax is going to have a big impact on the pocketbooks of Manitoba ratepayers and businesses.

About 50 percent of Manitoba homes use natural gas for their heating and appliance use. When the increase in the carbon tax by 2022 is taken into account, natural gas costs will increase by 32 percent. That is the highest increase of any energy source. Gasoline will go up 12 percent.

This jump in energy costs should concern Manitobans because natural gas represents 53 percent of energy use in a typical household that has access to it. Gasoline represents 28 percent. The increase in the carbon tax will add another $247 to the household price of natural gas and another $160 to gasoline.

Typical Manitoba households that rely solely on electricity – about 38 percent of all homes – for their energy needs pay $3,383 a year. Households that have access to natural gas spend $1,770 each year for energy. That's $1,600 less each year. Even with carbon taxes applied, natural gas remains a less expensive choice for families.

Government policymakers have a significant impact on household energy budgets. Changes to Manitoba'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 half of Manitoba's ratepayers relying heavily on natural gas for their energy needs it's important that governments recognize this and ensure the province has an economical and reliable supply of energy for consumers and businesses.

The Value of Energy Research Series illustrates energy bills, energy use and energy value for a typical Manitoba 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 Manitoba Hydro and the Manitoba Public Utility Board.

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

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

- Electricity provides 19%
- Gasoline provides 28%
- Natural gas provides 53%

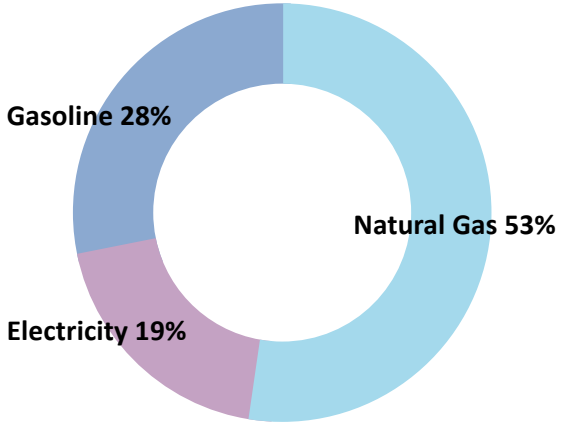
But not every household has this breakdown – this is an estimate based on a household that uses natural gas for heating, drives a car occasionally and uses appliances and electronics.

Approximately 262,400 Manitoba households, nearly half of the total, use natural gas for heating. The remaining homes rely on electric heating (e.g. baseboards), heat pumps, oil, propane, coal, wood or some combination for heat.

See page 7 for household figures that heat with electricity.

We use natural gas in

- Furnaces to warm our homes
- Stovetops to cook our food
- Hot water tanks for laundry and showers
- Industries and a key input fuel



We use gasoline to fuel

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

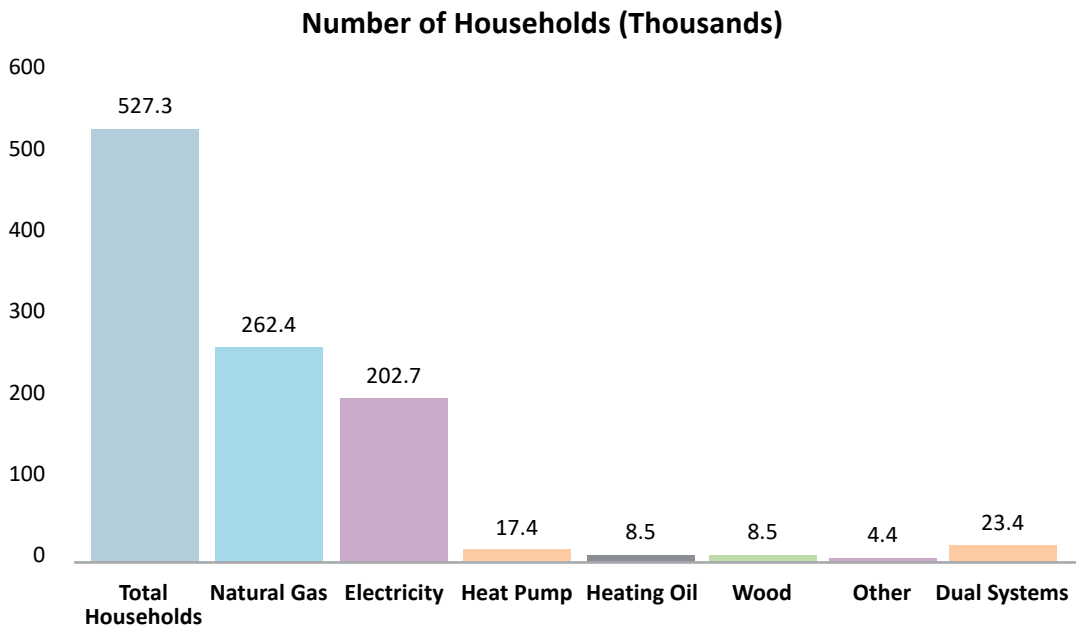
We use electricity to power

- Illumination to light the night
- Appliances for convenience
- Electronics for education and entertainment
- Smartphones to stay in touch
- Electric heating in much of rural Manitoba

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 262,400 households heat their homes with natural gas, 202,700 heat their homes with electric resistive heating (e.g. baseboards) and 17,400 heat their homes with heat pumps. Other households use coal, propane and wood for their heating needs.[1]



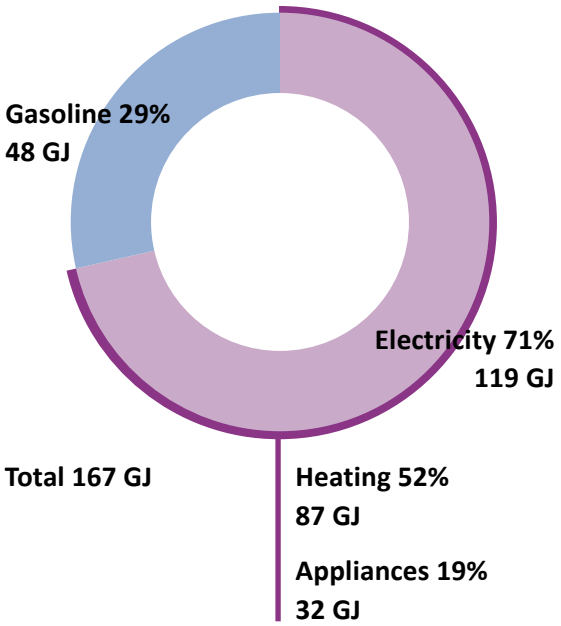
1. NRCan Comprehensive Energy Use Database, Manitoba, Table 21: Heating System Stock by Building Type and Heating System Type. See http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=mb&rn=21&page=0.

Energy Use Profiles for households heated with electricity[2]

The majority of Manitoba 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 Electric Baseboards or Boilers:

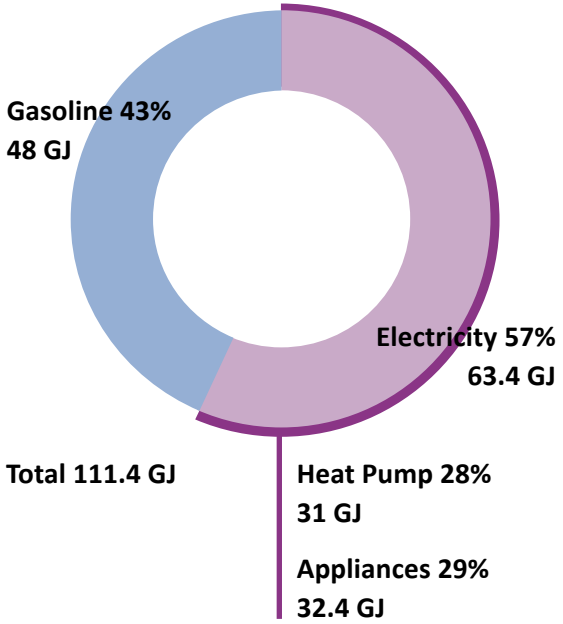
Over 202,700 Manitoba households rely on electricity to run their baseboards or boilers for heating as well as for their appliances and electronics. A household with baseboard electric heating might have an energy use profile matching the pie chart below, with electricity providing 71% and gasoline 29%.



Heating with Heat Pumps:

Over 17,400 Manitoba households rely on heat pumps to keep their houses warm. A household with a heat pump might use 28% of its energy to power the heat pump with electricity for appliances using up 29% and gasoline 43%.

The total energy used by a household with a heat pump is lower than for households that use other fuels for heating. Because heat pumps are so efficient at concentrating and moving heat, they use a lot less electricity to deliver the same amount of heat as electric baseboards or boilers.



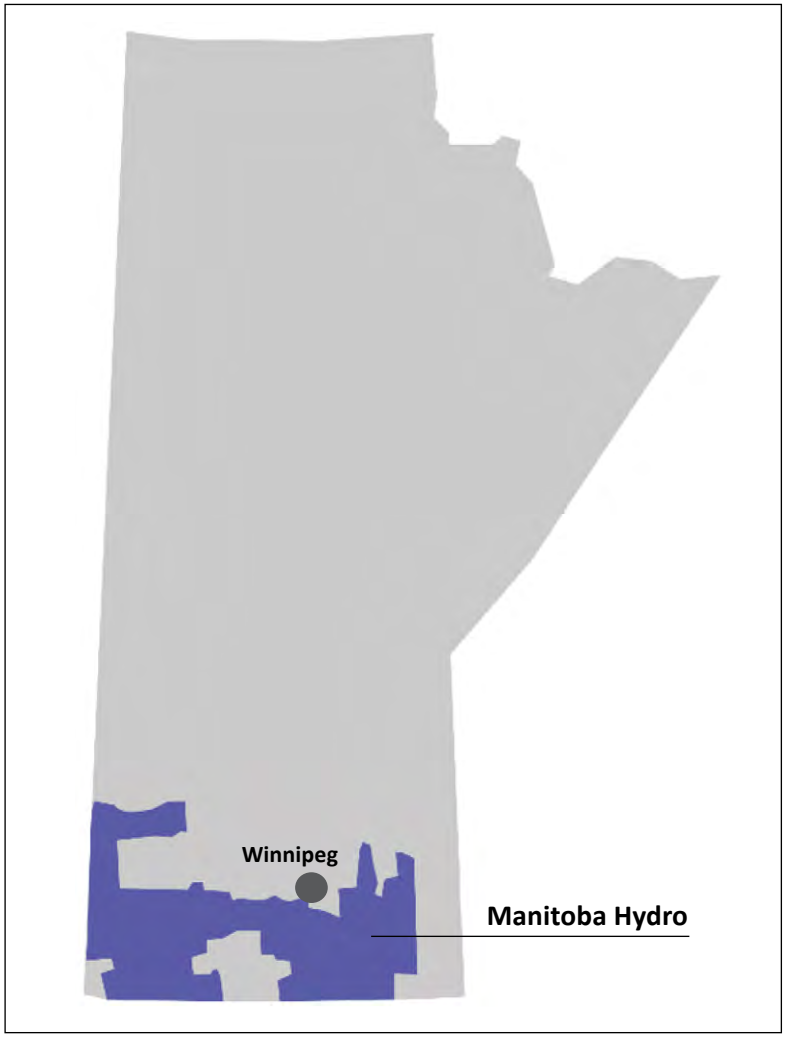
2. NRCan Comprehensive Energy Use Database, Manitoba , Table 21: Heating System Stock by Building Type and Heating System Type. See http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=mb&rn=21&page=0.

Which households have natural gas service?

Although about half of Manitoba households heat their homes with natural gas, not all households do.

Manitoba's natural gas distribution system covers some urban areas and rural communities, but many agricultural, low density and remote communities do not have natural gas service.

The map of Manitoba shows municipalities with (Winnipeg and blue area) and without natural gas service.[3]



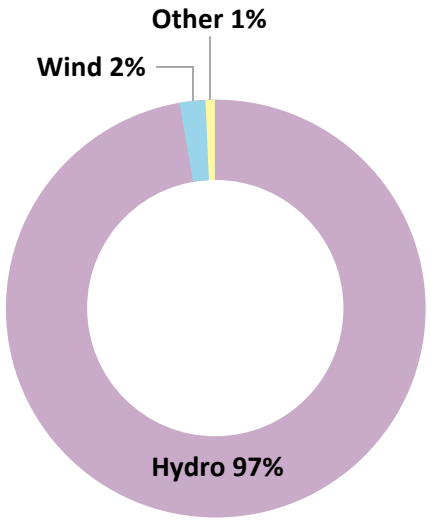
3. Canadian Gas Association.

Where does Manitoba's electricity (power) come from?

Manitoba households use electricity that is generated mostly through hydropower.

In 2016, Manitoba generated 36.6 terawatt hours (TWh) of electricity, which is approximately 6% of total Canadian generation. Manitoba's electricity generating capacity is 6,135 megawatts (MW).

The pie chart shows electricity generation by source in Manitoba: approximately 97% of electricity is produced from hydropower. The remaining 3% is produced primarily through other renewable sources, such as wind and biomass. Fossil fuels account for only a small portion of electricity generation in Manitoba.[4]



Hydro	35.5 TWh or 97%
Wind	0.73 TWh or 2%
Biomass/ Geothermal	0.11 TWh or <1%
Coal & Coke	0.06 TWh or <1%
Natural Gas	0.05 TWh or <1%
Petroleum	0.015 TWh or <1%
Total Generation	36.6 TWh

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

Typical Manitoba household bills and energy use

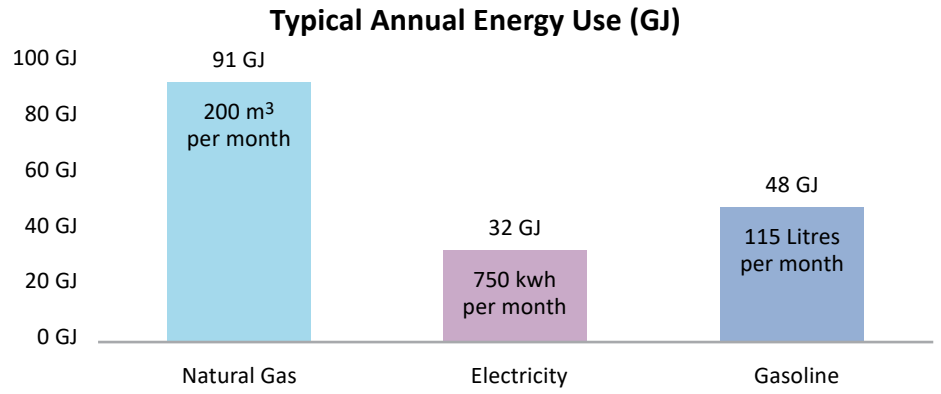
Here's the breakdown of how much energy a typical Manitoba household might use every year. This works out to be about 200 cubic meters (m3) of natural gas, 750 kilowatt-hours (kWh) of electricity, and 115 litres of gasoline a month.

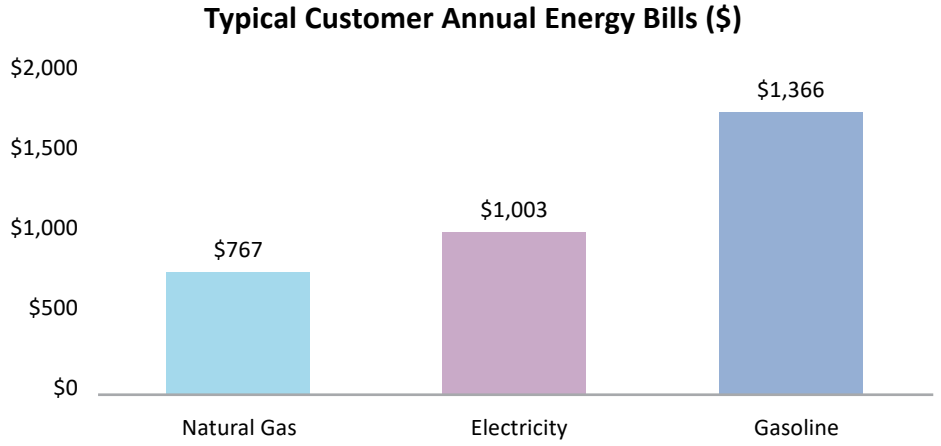
To show them all on the same chart, we've described the energy used in terms of Gigajoules (GJ) per year, a common unit useful for comparing different fuels on an "apples to apples" basis. A gigajoule is equivalent to 1 billion joules, roughly the amount of energy it takes to power a 30 Watt light bulb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

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

A typical Manitoba household spends about the same amount of money on natural gas and electricity, and quite a bit more on gasoline, even though they get more of the energy they use from natural gas.

These bills have been generated using the rate information on Manitoba Hydro website for a typical Manitoba customer. Some households will pay more and some will pay less.[5/6/7/8]



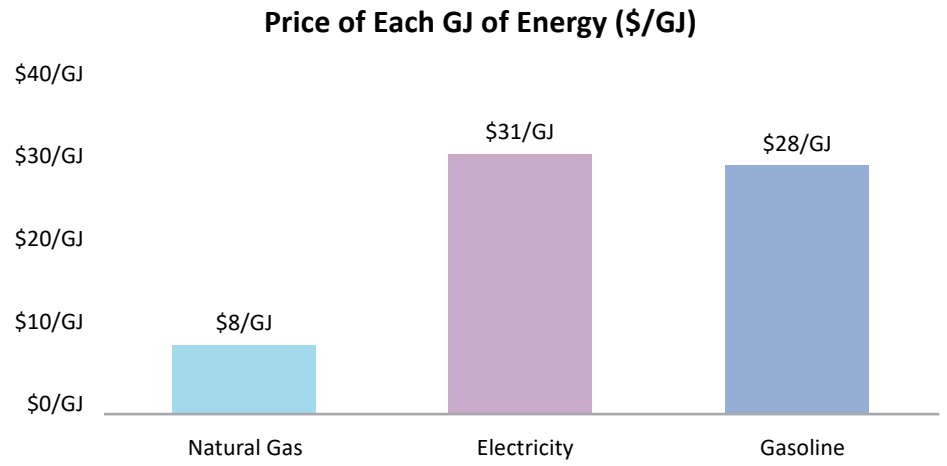


5. Electricity, Manitoba Hydro: https://www.hydro.mb.ca/accounts_and_services/rates/residential-rates.shtml.
6. Natural Gas, Manitoba Hydro: https://www.hydro.mb.ca/accounts_and_services/rates/residential-rates.shtml.
7. Gasoline Costs: See https://www.nrcan.gc.ca/energy/fuel-prices/4795.
8. Heating Oil Costs: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000101&pickMembers%5B0%5D=2.7.

The Value of Energy for Manitoba 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.

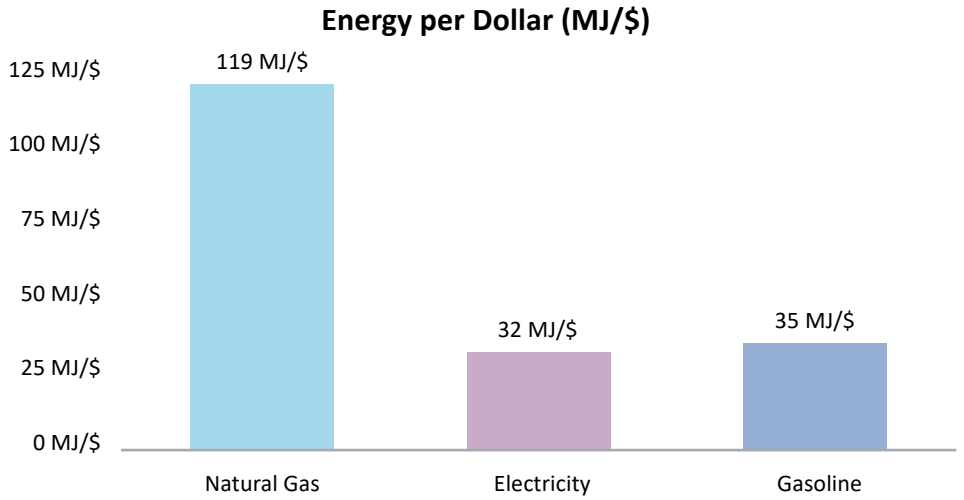
The chart shows how much a typical customer pays for each unit of energy – this is the price of energy (in dollars per gigajoule) and helps describe the relative value of different energy sources.



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).

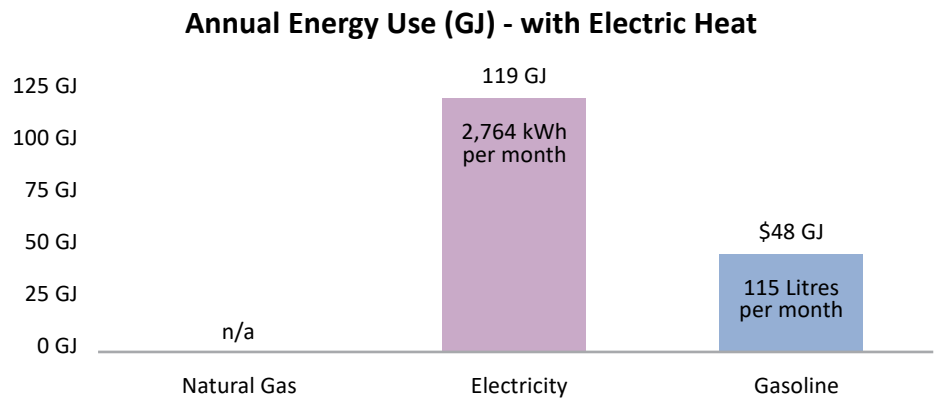
1 GJ = 1,000 MJ



A typical bill and household value of energy for Manitoba's 202,700 families that rely on electricity for heat

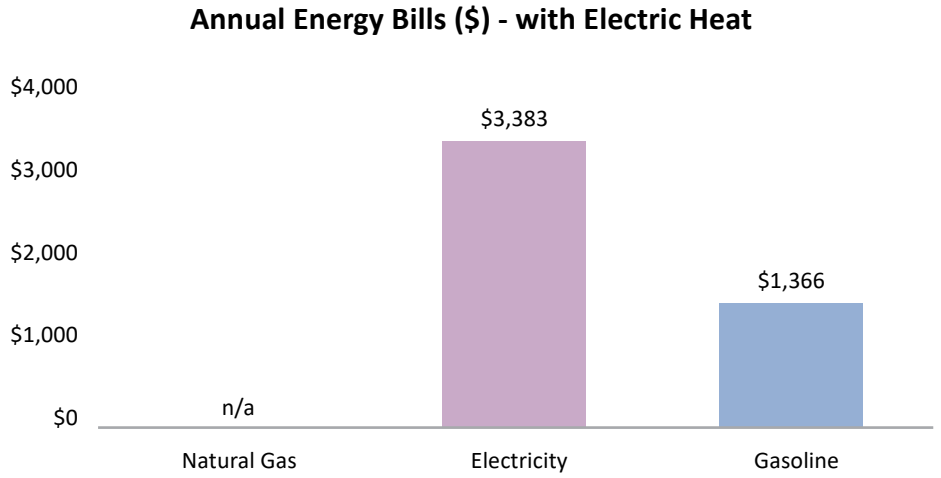
Manitoba households that rely on baseboard electricity for heating consume a lot of electricity compared to those that heat with natural gas or other fuels. Winter months would be higher but on average a household that heats with electricity might use about 2,764 kWh of electricity and 115 litres of 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 with electric heat might pay for energy every year.

A Manitoba household with electric heat would spend a lot on energy bills because heating requires a lot of energy, and because the price of electricity is relatively higher than other fuels.

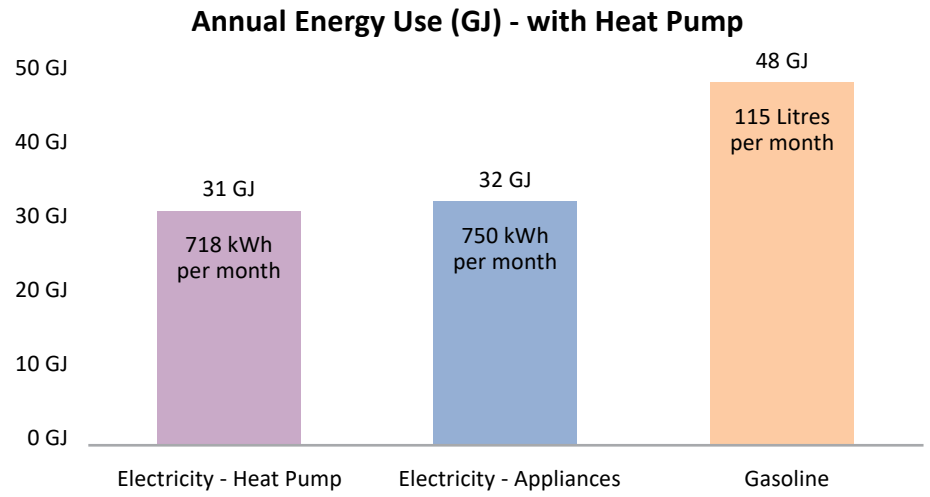


A typical bill and household value of energy for Manitoba's 17,400 families that rely on heat pump for heat

A Manitoba household that relies on a heat pump would have a similar looking picture to the typical household that relies on electricity, except their consumption used for heating would be different.

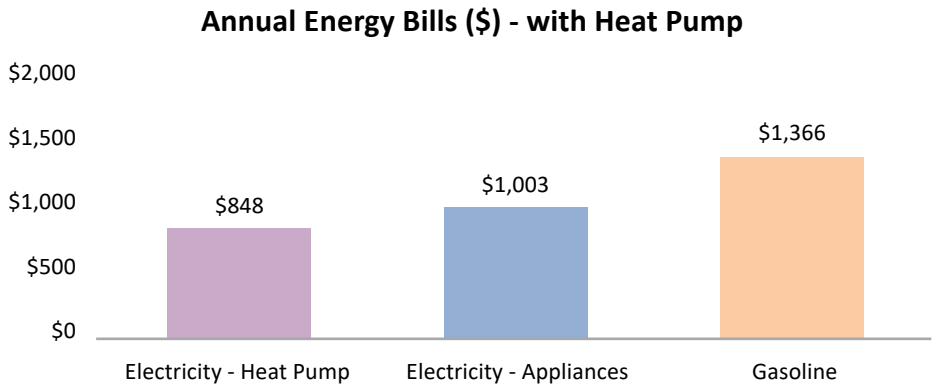
A household that uses heat pump for space and water heating might use an average of about 750 kWh of electricity for appliances and electronics, 115 litres of gasoline and 718 kWh of electricity to run the heat pump each month.

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 heat pump for energy might pay per year.

Heat pump costs calculated based on electricity consumption and rates.



9. See HSPF (average)=10 for Winnipeg: https://www.nrcan.gc.ca/sites/oee.nrcan.gc.ca/.../heating-heat-pump/booklet.pdf.

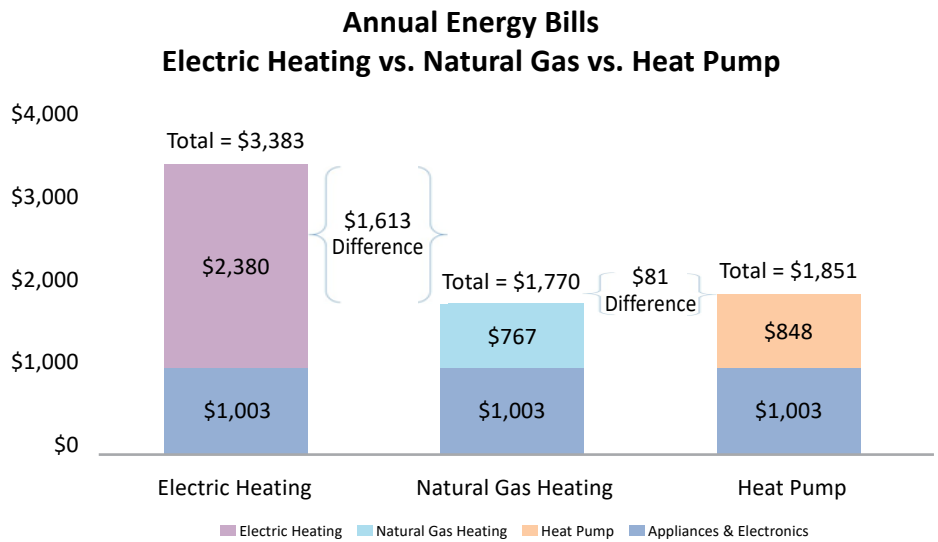
Comparing the costs of different fuels in Manitoba

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 a natural gas furnace, and the third household uses heat pump.

The difference in annual bills between the households heated with natural gas and electricity is over $1,600 due to the fact that the price of each unit of energy supplied with electricity is so much higher than natural gas.

The difference with heat pump is just $81 since heat pumps are very efficient heating systems.



Value of Energy for different Manitoba 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 are four Manitoba customers, representing different demographics and lifestyles, along with a comparison of how much they use and pay for energy.

Young Urban Single

Winnipeg

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

Brandon

Uses more energy and has higher bills

- Large house -> more natural gas
- More devices and appliances -> more electricity
- Two car commuters -> more gasoline

Small Town Retirees

Selkirk

Moderate energy use and energy bills

- Medium sized house -> moderate natural gas
- Some devices and appliances -> moderate electricity
- One car or light truck -> moderate gasoline

Rural Couple

Thompson

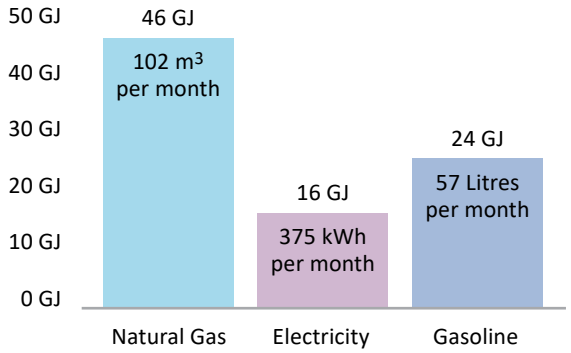
Moderate energy use and has higher energy bills

- Natural gas service unavailable -> heating with electric baseboards
- Electric heating with some devices and appliances -> very high electricity
- One truck -> more gasoline

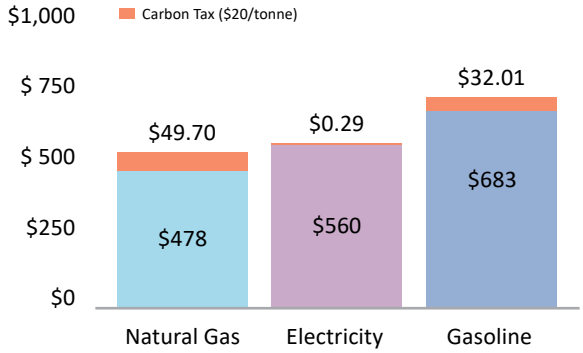
Value of Energy Customer Snapshot (Manitoba), which includes a tax on carbon dioxide emissions ($20/tonne)

Young Urban Single

Annual Energy Use (GJ/year)

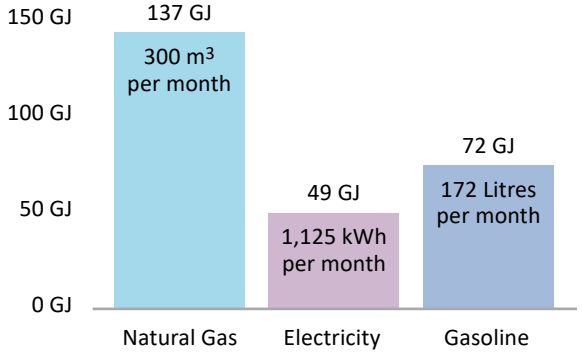


Annual Energy Bills ($) Total = $1,802

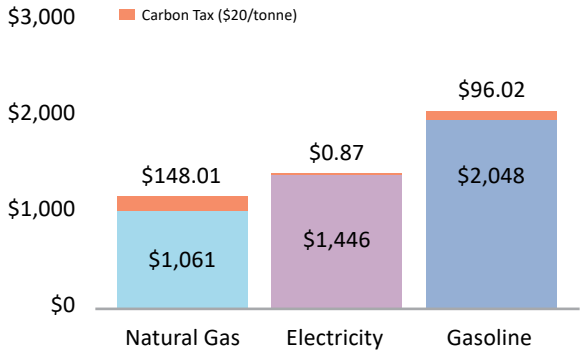


Suburban Family

Annual Energy Use (GJ/year)



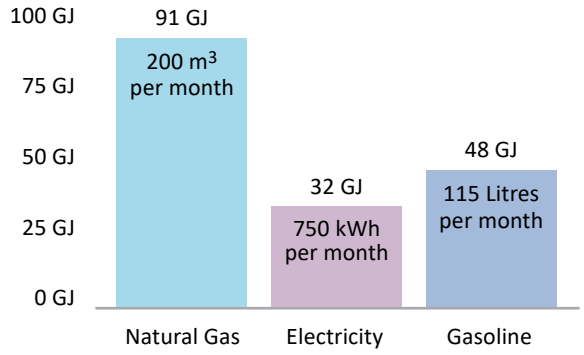
Annual Energy Bills ($) Total = $4,800



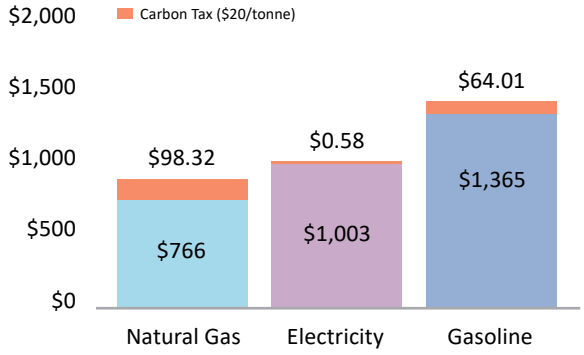
Value of Energy Customer Snapshot (Manitoba)

Small Town Retirees

Annual Energy Use (GJ/year)

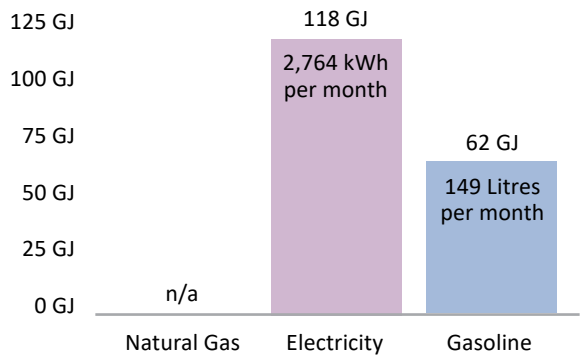


Annual Energy Bills ($) Total = $3,297

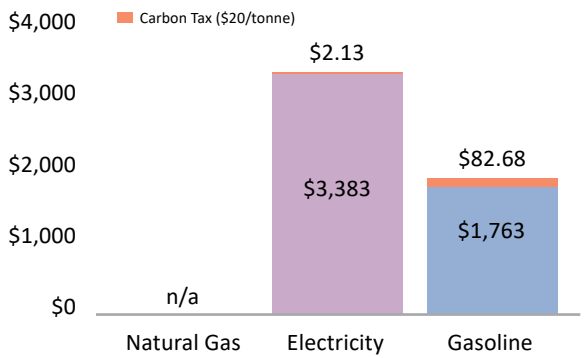


Rural Couple

Annual Energy Use (GJ/year)



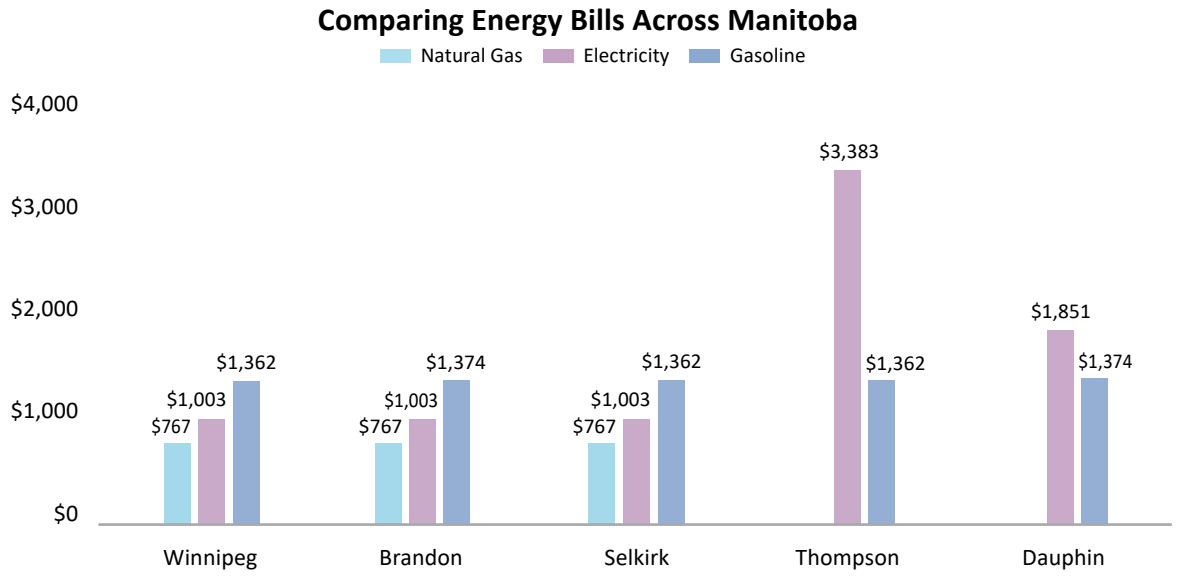
Annual Energy Bills ($) Total = $5,231



Value of Energy – Location impacts costs

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

- Electricity is served in all locations by Manitoba Hydro at the same rate.
- Natural Gas is served in Winnipeg, Brandon and Selkirk at the same rate.
- Thompson and Dauphin do not have access to natural gas.
- Thompson uses electric baseboard heating.
- Dauphin uses a heat pump.



10. Electricity, Manitoba Hydro: See https://www.hydro.mb.ca/accounts_and_services/rates/residential-rates.shtml.
11. Natural Gas, Manitoba Hydro: See https://www.hydro.mb.ca/accounts_and_services/rates/residential-rates.shtml.
12. Gasoline Costs: See https://www.nrcan.gc.ca/energy/fuel-prices/4795.

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

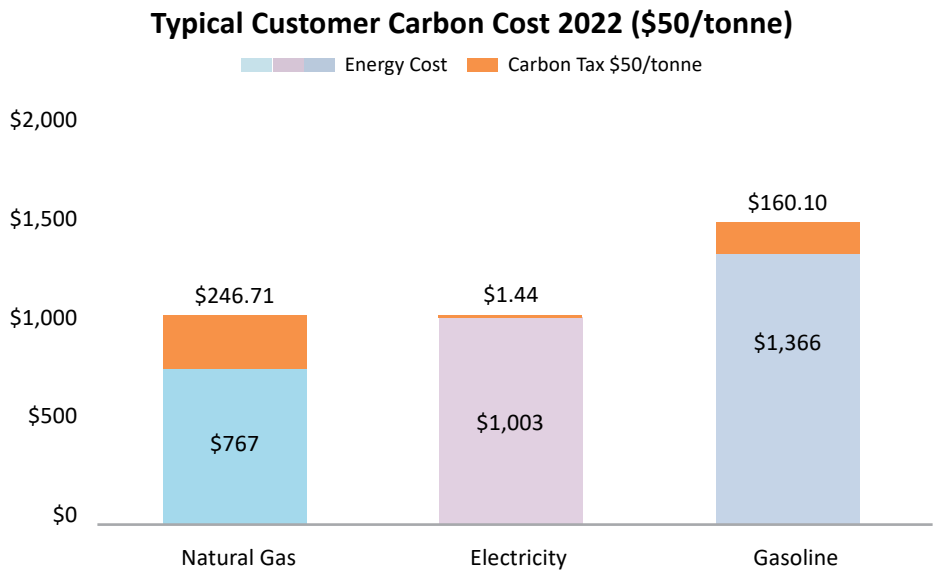
The federal government has announced that they will be introducing a national price on carbon in April 2019 and it will gradually reach $50/tonne of CO_2 in 2022.

The chart shows the impact of a $50/tonne tax on carbon would be for a typical household in Winnipeg.

A $50 tax on carbon dioxide emissions will increase total natural gas costs by 32% and gasoline by 12%.

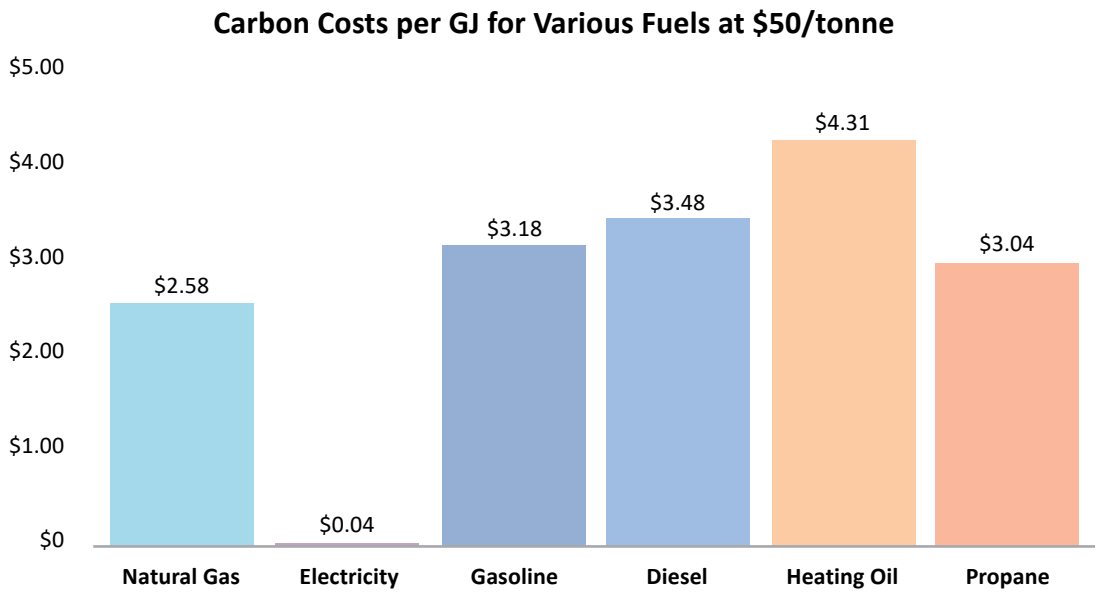
Due to Manitoba's nearly all renewable electricity generation mix, carbon pricing will not significantly impact electricity rates.

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



Carbon dioxide emissions costs for different fuels[13]

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 compares 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 their carbon dioxide content per gigajoule (GJ) and multiplies this by a carbon tax/price of $50/tonne of CO_2.



13. 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 Manitoba's 527,300 households, about 262,400 heat their homes with natural gas, 202,700 homes rely on electric baseboards, and 17,400 use a heat pump. The rest use heating oil, propane, coal, wood or some combination for heat.

Household budgets are affected by their energy use. Manitoba families with the lowest energy prices have access to natural gas or a heat pump.

Typical Manitoba households that rely on electricity for heating and appliances as well as electronics pay $3,383 a year for energy. Those that use a heat pump and electricity for appliances typically pay $1,851. And households that have access to natural gas – representing half of Manitoba homes – spend $1,770 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 Manitoba.

Government energy policymakers have a significant impact on household energy budgets. Changes to Manitoba'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 Manitoba.

Canadians for Affordable Energy

Manitoba Household Research Report

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