Mobiles and megawatts:

Why mobile homes use the most electricity

Report

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BC Hydro

Power smart

Mobiles and megawatts: Why mobile homes use the most electricity

Thousands of mostly retirement-aged British Columbians who live in mobile homes are at an energy disadvantage compared to other homes, which means higher costs. This is because mobile homes use more electricity per square foot than all other types of homes. Limited insulation options and some inefficient heating and cooling behaviours are large contributors to higher bills, and many are unaware of programs and inexpensive solutions that would drastically cut costs.

Highlights

- B.C. has one of the highest concentrations of mobile dwellings in Canada[1] with about 70,000 BC Hydro customers living in mobile homes.
  - The largest proportion of mobile homes in B.C. is located in the Southern Interior and more than 60% of the province's mobile home residents are over the age of 60.
- New BC Hydro data shows mobile homes use, on average, 50% more electricity per square foot than the average single-family home.
- In fact, while the size of mobile homes is similar to most apartments, energy use in this dwelling type is closer to that of townhouses or duplexes, which have a higher square footage.
- Due to the way mobile homes are manufactured, there are limited insulation options, which contributes to heat loss.
- In addition, inefficient heating and cooling methods to regulate temperature is the other factor largely to blame for higher electricity use in mobile homes:
  - About 20% use portable space heaters as one of their heating sources, which often have unreliable thermostats that may lead to overheating.
  - When it comes to heating and cooling, about 85% open windows at least some of the time to help regulate temperature swings in their homes, which can lead to heat loss in the winter and loss of cool air in summer.
- And, although 75% said they are interested in conserving energy and saving money, many are concerned about how much it will cost to make these changes or do not know where to start.
  - For example, of those who have not taken any energy-saving steps at home, 45% are concerned with the cost and about 20% just do not know where to start.
- The most common energy-efficient changes made by mobile home customers include replacing inefficient lighting (75%) and purchasing energy-efficient appliances (about 50%) while 14% have installed a heat pump.
- Heating can account for up to 50% of a BC Hydro bill in the colder months, so improving heating and insulation is the most impactful efficiency change.

1 2016 Census Statistics Canada—Type of dwelling tables

Solutions

BC Hydro recommends mobile home customers take the following measures to save money and energy:

- Taking advantage of rebates and incentives: BC Hydro offers home renovation rebates year-round to improve a home's energy efficiency, including rebates up to $2,000 for upgrading windows and doors, and up to $2,000 for installing a heat pump—the most efficient way to cool in the summer and heat in the fall and winter.
- Enrolling in energy saving programs: BC Hydro offers the income-qualified Energy Conservation Assistance Program and energy saving kits that provide advice and products to make energy-efficient home upgrades.
- Tracking electricity use: Use MyHydro to see how everyday actions like turning on a space heater affect electricity usage.
- Joining the team: Customers can sign up for Team Power Smart and commit to cutting electricity consumption by 10% over the year, earning a $50 reward if successful.

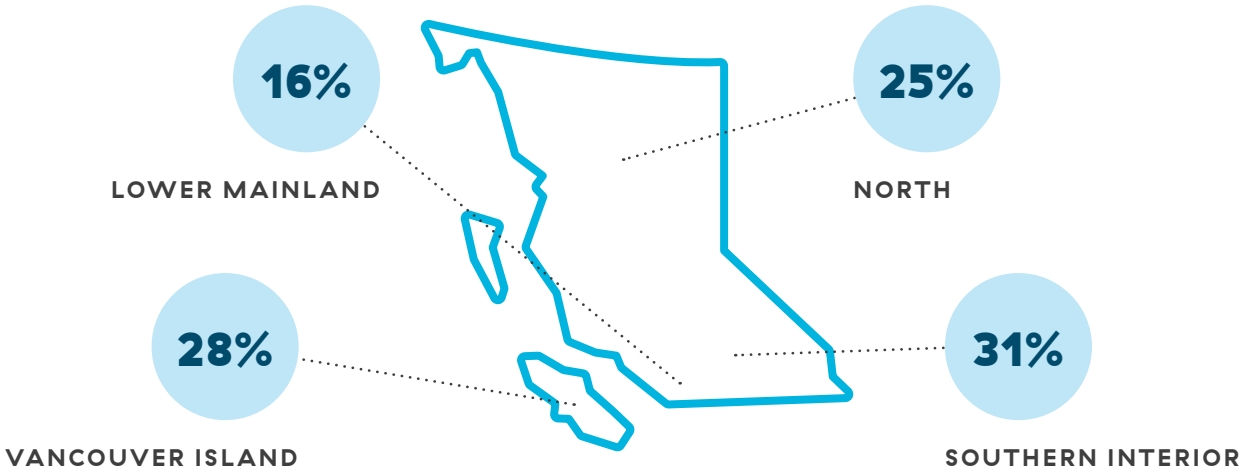
Mobile homes by the numbers

With milder weather compared to the rest of the country, British Columbia has one of the largest concentrations of mobile home dwellings in Canada.[2] About 70,000 BC Hydro customers—or 4% of its customer base—live in mobile homes and the largest proportion of mobile homes in B.C. is located in the Southern Interior (one-third).

While mobile homes are an economical housing option, new BC Hydro data shows mobile homes, on average, use 50% more electricity per square foot than the average single-family home. A survey[3] commissioned on behalf of BC Hydro found this excess energy use is contributing to higher bills even though most mobile home owners are interested in conservation and saving money.

This report will explore why mobile homes use proportionally more electricity than other dwelling types, despite customers' best intentions to conserve.

WHERE THE MOBILE HOMES ARE IN B.C.



2 2016 Census Statistics Canada—Type of dwelling highlight tables
3 Survey conducted by BC Hydro using a sample of customers living in mobile homes from Sept. 18 to Sept. 23, 2020.

Mobile home customer profile

- Long-term residents—most have lived in their mobile home over 10.5 years
- Most are retirement age—over 60% are aged 60 or over
- Lower income—half of mobile home customers have an income lower than $40,000 a year
- On First Nations land—mobile homes make up 22% of dwellings on First Nation lands

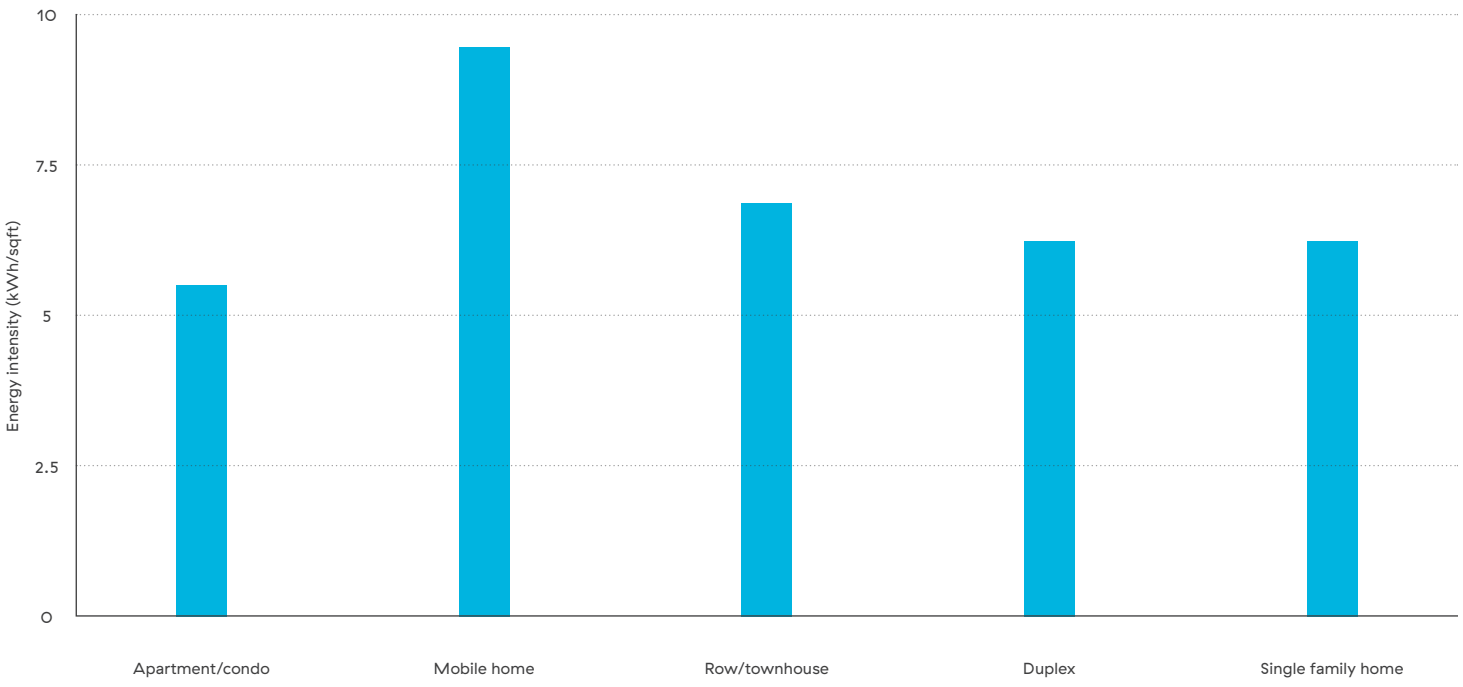
High energy homes

Most mobile homes in British Columbia are close to the size of an apartment. In fact, about half of BC Hydro mobile home customers indicated their home is less than 1,000 square feet. However, BC Hydro data shows mobile homes have a 61% higher energy use intensity by square foot compared to all other dwelling types, including single family homes and townhomes.

For example, in 2017, the average annual consumption of a BC Hydro mobile home customer was 158% higher than that of a similarly sized apartment. When compared with a townhome, which is larger in size than most mobile homes, the annual average energy consumption is 28% higher in mobile homes.

This means mobile homes have much higher energy intensity—or they use more energy per square foot than any other dwelling type. For example, mobile homes use 9.1 kilowatt hours of electricity per square foot while a single detached home uses 6 kilowatt hours of electricity per square foot.[4] As a result, mobile homes on average use 50% more electricity per square foot than the average single-family home.

AVERAGE ANNUAL ENERGY INTENSITY (KWH/SQFT) BY HOME TYPE



This intense energy footprint is contributing to higher monthly bills—43% of mobile home customers indicated they find their BC Hydro bill is too high.

Aging and energy efficiency

Energy efficiency problems exist in every type of housing—from detached homes and duplexes to condominiums and townhomes. Even brand new dwellings could benefit from small changes that will improve energy efficiency. However, the design of mobile homes makes them more vulnerable to energy efficiency problems, especially older models.

About 70% of mobile home customers surveyed indicated they live a mobile home that is more than 20 years old. According to the U.S. Department of Energy's Residential Energy Consumption Survey, mobile homes built before 1980 consume on average, 53% more energy per square foot than all other types of homes.[5]

Statistics Canada research also shows that newer dwellings, including newer mobile homes, use less energy because of improved construction practices and changes to building codes—such as the use of improved insulation and more efficient heating and cooling systems.[6]

Heating and cooling inefficiently

One of the major reasons for the higher energy consumption of mobile homes is inefficient heating and cooling behaviours. Of the 70,000 mobile homes in B.C., about one-third are in the Southern Interior, which experiences more temperature variation than many other regions in the province—with very hot summers and cold winters. This can be a challenge for heating and cooling. For example, the town of Lytton in B.C.'s Southern Interior is consistently one of the hottest places in Canada, with temperatures reaching a record-breaking 41.4 degrees Celsius in July 2020.

When it comes to cooling, BC Hydro data shows 51% of mobile home customers use a cooling system in the summer—this is higher than other dwelling types.[7] Many mobile home customers also use portable air conditioners, which use 10 times more energy than a central air conditioning system or a heat pump and use twice as much energy as a window unit. In fact, according to BC Hydro data,[8] the average mobile home customer uses a portable air conditioner for about 6.9 hours a day, which adds up to about $75 over the summer months. In contrast, using a fan to cool a space costs just $7 for nine hours a day over the summer months.

Similarly, about 20% of mobile home customers indicated using electric portable space heaters as one of their main heating sources during the fall and winter months. While portable space heaters might be a convenient supplementary source for a small room or enclosed space, they are an expensive way to heat a home. For example, a 1500W portable electric space heater left on for 12 hours a day will cost over $60 a month, or upwards of $300 from November through March.

In addition to space heating, about 85% indicated they open windows at least some of the time to help regulate temperature swings in their mobile homes. However, opening doors and windows can have the opposite effect—letting warm air escape in the winter and cool air escape in the spring or summer. Mingling indoor and outdoor temperatures often causes the heating or cooling system to work much harder, resulting in more energy use and higher bills.

BC Hydro data[9] also shows 12% of mobile home customers rely on woodstoves as their primary heating source, which can be economical but not always practical as a home-heating strategy as it requires a continuous supply of logs, woodchips or other biomass. In addition, most stoves and sealed fireplaces still require some electricity to operate circulating fans.

One of the best ways to regulate temperature and save money is by installing a programmable or smart thermostat to schedule specific times to heat or cool a mobile home. Using a programmable thermostat to manage heating and cooling can save up to 15% in energy costs over a year.

Installing a heat pump to heat in the winter and cool in the summer is an even bigger step towards energy efficiency. A heat pump provides all the advantages of air conditioning along with effective and efficient heating. Considering the largest number of

5 Environmental and Energy Study Institute
6 Statistics Canada
7 BC Hydro 2020 Residential End-Use Study—cooling
8 BC Hydro 2020 Residential End-Use Study—cooling
9 BC Hydro 2017 Residential End-Use Study—space heating

mobile home dwellers are in the Southern Interior and already use air conditioning, the opportunities to save are the highest for them because they would get the benefit of more efficient heating and cooling.

There are a few types to consider, but because of space constraints, the best option for a mobile home is a ductless system, which works best in smaller homes with more open designs. A ductless system consists of an indoor air handler and an outside condenser, and is smaller than a typical system. A central heat pump system is typically a package unit installed outside the home connected to the air ducts, and is best for a single family home or townhome with a crawl space or attic to connect the duct work.

When it comes to cost, heating a 900 square foot mobile home for 12 hours a day with a ductless heat pump costs about $35 a month, compared to $60 a month for just one electric space heater.

Insulation is key

One of the key components for an energy–efficient mobile home is ensuring it is properly insulated where possible to avoid heat loss. Interior air cannot stay at a desired temperature for long without proper insulation.

Most mobile homes are placed up on posts and piers, and the open foundations make proper insulation critical.[10] However, many mobile homes do not have sufficient insulation in their walls, ceiling or flooring. For example, less than 30% of mobile home residents surveyed indicated they have added roof or flooring insulation in their mobile home.

Regardless of type used, upgrading insulation will help save at least 10% of a mobile home's energy cost and improve comfort year–round.

Sealing the efficiency deal

In addition to proper insulation, it is essential to check for any gaps and cracks that may need to be sealed up to prevent air from escaping. Gaps and cracks around windows and doors allow cold air to enter the home in the winter, causing the heating system to work harder. In the summer, these drafts bring hot air in, making the home less comfortable, which may lead to cranking up the A/C or a fan to cool down.

Over half of those surveyed said they have not draft proofed the windows or doors of their mobile home for insulation, even though sealing up doors and windows is one of the most cost–effective steps to improve a mobile home's efficiency and keep drafts at bay. Applying foam weather–stripping or caulking around windows and doors is a great preventative measure for drafts. Spray foam will fill most under sink bypasses, and ducts can be sealed with heat–resistant aluminum duct tape. Adding plastic sheeting to your windows, also known as a window kit, is another good way to add a layer of insulation in the cold winter months.

Conservation concerns

While about 70% of mobile home customers live in a mobile home that is over 20 years old and likely in need of energy–efficiency upgrades, most of the upgrades that customers indicated making do not address insulation or heating and cooling.

Instead, of those that have made energy efficient changes, most replaced inefficient lighting (75%) and almost half purchased energy–efficient appliances, which are good steps, but not as impactful as making changes to heating and insulation, which can account for up to 50% of a BC Hydro bill in colder months.

In addition, although 75% said they are interested in conserving energy and saving money, many are concerned about how much it will cost to make these changes or don't know where to start. In fact, of the 10% that have not made any energy–saving changes at all, 45% list their reason as cost and 20% just don't know where to start.

10 NRCAN Keeping the Heat In report

Although many indicated cost as a barrier for making energy-saving changes, the majority (67%) of mobile home residents have never participated in a BC Hydro rebate program or incentive. In addition, almost half said they don't use MyHydro—BC Hydro's online energy tracking tool—or do not know what it is. BC Hydro data also shows only about 40% of mobile home accounts have a My Hydro profile.

Keeping costs down

BC Hydro offers many programs to help customers achieve energy efficiency in their homes, including the Energy Conservation Assistance Program and energy saving kits. The Energy Conservation Assistance Program offers eligible customers free energy assessments and energy-saving products like draft proofing which can result in significant savings each year. More than 17,000 customers have participated in the program.

Energy saving kits provide qualifying customers with easy-to-install, energy saving items such as LED lightbulbs, weather stripping products, high-performance showerheads and water-saving aerators. These products can help customers save up to $100 in electricity costs each year. Over 130,000 low-income homes have received energy saving kits since the program launched in April 2008.

For bigger projects, BC Hydro offers home renovation rebates year-round to improve a home's energy efficiency. Rebates include up to $2,000 for installing energy efficient windows and doors that prevent air from escaping, as well as up to $5,500 for upgrading a home's insulation—one of the best ways to avoid heat loss. There are also rebates for up to $2,000 for installing a heat pump—including a variable speed mini-split ductless system that is perfect for a mobile home. In the past two years, about 400 mobile home customers have taken advantage of the rebate to install ductless heat pumps in their homes.

It is also important to track electricity use using BC Hydro's online electricity tracking tool, MyHydro. Using this tool will allow customers to examine habits that are using more energy -such as using a space heater—allowing adjustments to be made. Adjustments can be tracked and customers can get motivated to save by signing up for Team Power Smart and commit to cutting electricity consumption by 10% over the year, earning a $50 reward if successful.

In addition, BC Hydro offers plenty of options to customers that are having trouble paying their BC Hydro bill, including flexible bill payments. Customers facing temporary financial hardship and possible disconnection of their service due to job loss, illness, or loss of a family member may also be eligible for BC Hydro's Customer Crisis Fund, which provides access to grants of up to $600 to pay their bills.

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