

REQUESTOR NAME: **SkyWind Foundation**
INFORMATION REQUEST ROUND NO: **2 – IR-1**
TO: BRITISH COLUMBIA HYDRO & POWER AUTHORITY
DATE: **December 1, 2016**
PROJECT NO: **3698869**
APPLICATION NAME: **BC Hydro F2017-F2019 Revenue Requirements**

1.0 Reference: Water Heaters

When I lived in an apartment my BC Hydro bill was about \$18 every two months. It got as low as \$16 (for two months) when I was away three weeks – suggesting the main usage was running the refrigerator. Thus what I call basic electric needs for lighting, computer/printer, television, daily cooking (sans oven) and refrigeration were met with minimal consumption of KWh. When I moved into a townhouse type unit my consumption went up so much I was into Tier 2 rates. Electric heating was not a factor in the summer months so the main/only difference was now having an electric water heater. This I found out from phoning BC Hydro who also advised that come the Autumn my usage would double and then triple in Winter (based on historical records) due to electric heat. My BC Hydro bill would be approaching what I was paying for rent! I moved to an apartment with \$9/month electrical consumption.

BC Hydro notes that 63% of energy use is toward heating hot water tanks and meeting household heating needs. Further BC Hydro notes 42% of such heating requirements come from electrical heating. The Infographic, on energy usage, electronically published by BIV News November 26, 2026 shows indicates 14% of energy use is toward water heaters (and 47% toward cooling and heating).

This Infographic is available as an attachment and summarized below.

TOP TEN ENERGY USAGES IN HOMES (from Visual Capitalist InfoGraphic)

| | | | |
|-----------------|-----|---------------|------|
| Cooling/Heating | 47% | Water Heater | 14% |
| Lighting | 12% | Washer/Dryer | 13% |
| Refrigerator | 4% | Electric Oven | 3-4% |
| TV, DVD, Cable | 3% | Dishwasher | 2% |
| Computer | 1% | | |

It is acknowledged that these are based on American consumption usage and if anything Canadians would have higher heating and water heating percentages (i.e. as put forward by BC Hydro as 63%).

There are no alternatives to electricity usage for operating television, stereos, lighting which are minimal impacts on consumption (there are gas alternatives to electric stoves but even oven usage only rates 3-4%). Heating (water tanks and having comfort temperatures) can be provided through solar heating. This information requests focusses on water heating.

- 1.1 What would be the cost of a solar heating system for water tanks
 - a) During housing unit construction
 - b) After housing unit construction
- 1.2 Please describe a basic solar heating system (for water tanks) and how it may be installed in housing units and that it could function without direct sunlight. Perhaps include mention of need of a one way valve to prevent reverse flow of coolant in the evening.
- 1.3 Please outline/describe different types of units and their pros and cons.
- 1.4 Would glycol coolant be necessary in units in the lower mainland and coastal areas of Vancouver Island?
- 1.5 Please break out equipment costs and installation costs.
- 1.6 How would the costs come down with increased volumes (i.e. economies of scale)?
- 1.7 Please discuss pros and cons of having the water tanks placed in the attic versus on the ground level.
- 1.8 Could BC Hydro's \$1,700 subsidy for conversion be extended to solar heating units?
- 1.9 Could modules (of solar panels and piping) be devised that they could be put in place after construction?
- 1.10 How many KWhours of consumption be saved per 100 units of solar panel installation?
- 1.11 What would be the payback period for units (not including proposed rate increases)?
- 1.12 What level of subsidy might be needed to encourage installation of solar heating units?
- 1.13 If not financially viable now at what rate would KWhours and usage have to be to reach a ten year return and twenty year return periods a justifiable investment (break even points)?
- 1.14 How might economies of scale work to reduce costs? For instance would it be reasonable to forecast that costs would be halved if a thousand units a year were being produced? How much might the costs be reduced if production reached 10,000 units a year? 100,000 units?
- 1.15 Given there are few heating solar panels installed now – could there not be the creation of an industry in British Columbia to manufacture (and install them) to benefit business and employment creation in the province? Might then the province be a leader in such production and facilitate exporting to other provinces and countries?

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INFORMATION REQUEST ROUND NO: **2 – IR-2**
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2.0 Reference: Heat Pumps for heating and cooling

Last century when I was responsible for building sixteen homes for a community in Northern BC there was a chance to include a heat pumping system that would connect all the homes and reduce heating costs substantially. The homes could (and were) built as rent-to-own units with less than \$600/month rent with a fifteen year “payback” period. Although the heat pump system would have provided only roughly more than 12% increase in the price of each home it would have increased the payback period to 22-23 years – compound interest being what it is (a fifty percent increase in payback period for only a slight increase in costs).

In addition we couldn’t discuss the matter with future tenants as they were not selected at the time of having to make a decision and the technology was somewhat new and untested plus there was a concern that if there was a break in one place then all sixteen units would be impacted (with repair/service far away) with repair/maintenance personnel far away.

BC Hydro notes that 63% of energy use is toward heating hot water tanks and meeting household heating needs. Further BC Hydro notes 42% of such heating requirements come from electrical heating. The Infographic, on energy usage, electronically published by BIV News November 26, 2026 shows indicates 47% toward cooling and heating. Heat pumps could meet the need for most of this heating and cooling.

- 2.1 Please describe what a heat pump system (e.g. horizontal) for a neighbourhood might look like and how it operates?
- 2.2 What would be the cost of installing a heat pump system for a community (block by block)
 - c) During housing unit construction
 - d) After housing unit construction
- 2.3 Please break out equipment costs and installation costs.
- 2.4 Please outline/describe different types of units and their pros and cons.
- 2.5 How would the costs come down with increased volumes (i.e. economies of scale) for say 10, 20, 50, 100 housing units at a time?
- 2.6 Could BC Hydro consider being the Utility holder/provider for such heat pump systems where they provide the capital for installation (to keep away from the cost of the house) and provide the service for repairs in case of failures and interruptions?

- 2.7 Please describe heat pump systems that are vertical and compare and contrast them with horizontal systems (providing pros and cons).
- 2.8 How many KWhours of heating/cooling consumption might be saved per 10 units of housing having such installation?
- 2.9 What would be the payback period for heat pump units?
- 2.10 If BC Hydro would not consider providing and operating such system what level of subsidy might be needed to encourage installation of heat pump units?
- 2.11 If not financially viable now at what rate would KWhours and usage (i.e. what would consumption usage level) have to be to reach a twenty year and thirty year return justifiable investment (break even points)?

REQUESTOR NAME: **SkyWind Foundation**
INFORMATION REQUEST ROUND NO: **2 – IR-3**
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3.0 Reference: Tier system for charging for electricity usage

Right now BC Hydro has a two tier rate charge system and indications are that it is successful in reducing consumption.

3.1 What would rate increases look like if it was only the second tier that had the price increase?

3.2 Could consideration given to a four or five tier rate system? such as

| | |
|------------|---------------------------------------|
| Tier One | Up to 1000 KWh consumption per period |
| Tier Two | 1,000 to 1,500 KWh |
| Tier Three | 1,500 to 2,000 KWh |
| Tier Four | 2,000 to 2, 500 Kwh |
| Tier Five | 2,500 KWh |

3.3 Would not having multi-Tier system further encourage electrical conservation?

3.4 What would the consumption rates be at each Tier?

3.5 If not the Tier breakdown system suggested in 3.2 what might be a better division between the Tiers?

3.6 Are there existing examples (e.g. California) that might be drawn on for reference?

3.7 What would be the pros and cons of having a multi-tier rate system?

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INFORMATION REQUEST ROUND NO: **2 – IR-4**
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4.0 Reference: Pacific Northwest Electric Power Planning and Conservation Act

There is a Pacific Northwest Hydro provision (e.g. Law in Washington State) that stipulates no new hydro projects may be built if an alternative way to make up the electrical needs can be found. Reference: Pacific Northwest Electric Power Planning and Conservation Act

<http://www.nwenergy.org/>

- 4.1 Would such a provision be useful in British Columbia?
- 4.2 Would it lead to more alternatives and innovative ways to meet energy needs?

REQUESTOR NAME: **SkyWind Foundation**
INFORMATION REQUEST ROUND NO: **2 – IR-5**
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5.0 Reference: Solar Panels for Electricity Generation

I am aware of solar panel generation units that were installed and ended up paying for themselves in seven years (despite initially figuring that it would take fifteen years). These examples were in Alberta where I appreciate have more sunlight hours than most of British Columbia. BC Hydro states that solar panels for electrical generation are not cost effective (at this time).

- 5.1 Is the calculation based on providing electric current to the grid?
- 5.2 Please describe a basic solar panel arrangement and how it might be used to provide electricity for a home or business.
- 5.3 What would be the costs for such a unit? What portion of the costs would be for the batteries component?
- 5.4 What might be the payback period to recover the costs?
- 5.5 How have these costs come down in the last ten years and how much might those costs be expected to be reduced in the next ten years?
- 5.6 If such solar panel configurations were able to provide surplus electricity to go to the grid what rate would such providers be paid?
- 5.7 What rate would be BC Hydro have to be charging before such configurations would be viable?
- 5.8 Are there places in British Columbia (e.g. the Okanagan) that such systems would be viable? If not what kind of subsidies might make them viable?

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INFORMATION REQUEST ROUND NO: **2 – IR-6**
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6.0 Reference: Solar Panels for Water Heaters

This query is in regards to the potential to replace the need for additional electricity generation projects by conservation through replacing electric generated water heaters with solar panel type units.

- 6.1 If solar panel water heaters could be used to replace the need for electric heating how many such systems would it take to replace the need to generate 1 Mega Watt of energy? I calculate 250,000 units (with a twenty year life span).
- 6.2 Instead of funding a multi-billion dollar project how many such solar panel units could be financed per billion dollars? I calculate 250,000 units at \$4,000 a unit.
- 6.3 If units cost \$8,000 each would not a 50% subsidy make having these units viable?
- 6.4 If my calculations are close then would it not be better to finance solar heating panels than to build more dams? Particularly since we could build the units locally (create industry and employment) and not need to expend capital on foreign bought heavy duty equipment (funds going outside the country)?
- 6.5 Would it not be better (e.g. for the environment) to replace consumption usage rather than generate new capacity?
- 6.6 My calculations suggest outright financing of such units would be justifiable – at what point (percentage) do you calculate cost effective would occur (50% 40% 30%)?
- 6.7 Would not BC Hydro Revenue Requirements be significantly less if there a substantial number of households (and businesses) using solar heating panels and devices?

What uses THE MOST ENERGY IN YOUR HOME?

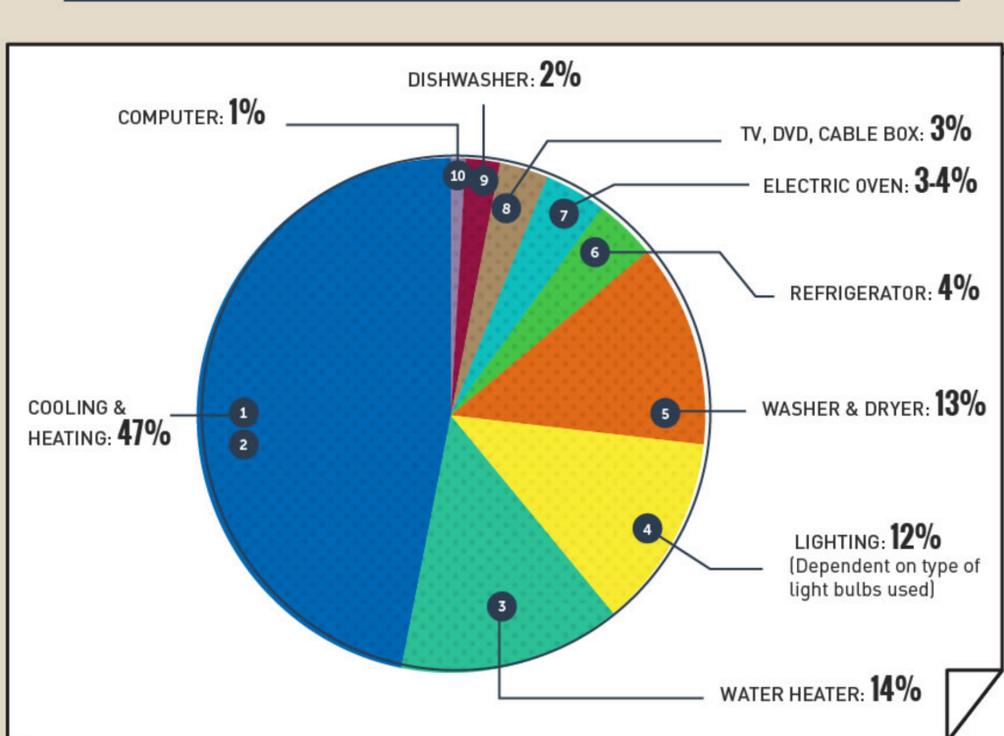
RESIDENTIAL ENERGY CONSUMPTION IS THE THIRD LARGEST USE OF ENERGY IN THE U.S.

OF THAT RESIDENTIAL CONSUMPTION...



SO WHAT EXACTLY IS THAT ENERGY GOING TOWARDS?

TOP TEN ENERGY USERS IN YOUR HOME:



10 COMPUTER:
Average cost per household: \$28 PER YEAR

5 WASHER & DRYER
Average cost per household: \$143 PER YEAR

9 DISHWASHER
Average cost per household: \$49 PER YEAR

4 LIGHTING
Average cost per household: \$28 PER YEAR

8 TV, DVD, CABLE BOX
Average cost per household: \$57 PER YEAR

3 WATER HEATER
Average cost per household: \$317 PER YEAR

7 ELECTRIC OVEN
Average cost per household: \$90 PER YEAR (Based on one hour of 350 degree usage daily)

2 COOLING
Average cost per household: \$394 PER YEAR

6 REFRIGERATOR
Average cost per household: \$95 PER YEAR

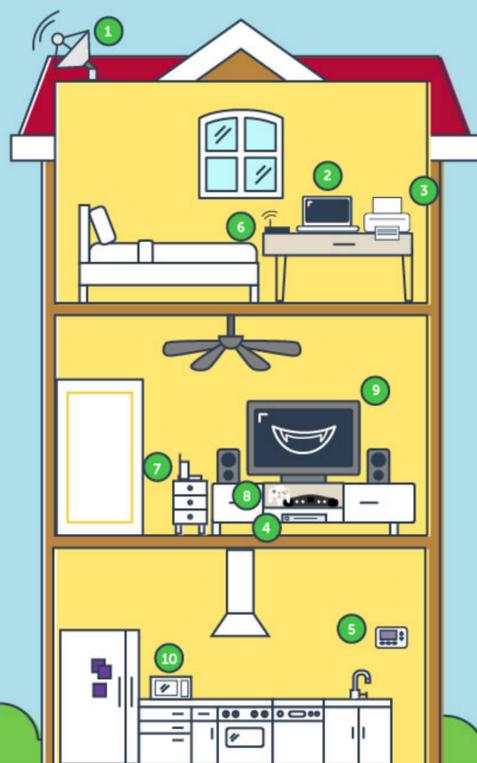
1 HEATING
Average cost per household: \$662 PER YEAR

TOP TEN "VAMPIRE" APPLIANCES

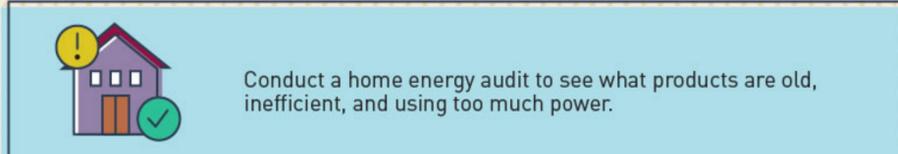
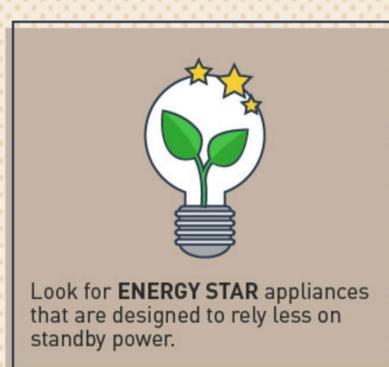
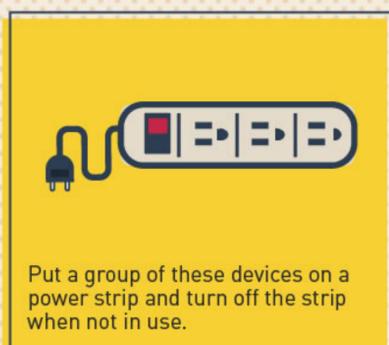
VAMPIRE APPLIANCES OR ELECTRONICS USE ENERGY EVEN WHEN THEY ARE SWITCHED OFF, OR ARE NOT PERFORMING THEIR PRIMARY FUNCTION.

THE WORST VAMPIRES IN A HOME ARE...

- 1 SET-TOP BOX (Both Digital Cable or Satellite DVRs)
- 2 COMPUTER (Laptops use more energy than desktops)
- 3 PRINTERS (Inkjet and multi-use printers use the most)
- 4 DVD/VCR (Get rid of that VCR! It uses twice as much energy)
- 5 CENTRAL HEATING FURNACE (Even when "off," a furnace can use a lot of electricity)
- 6 ROUTERS & MODEM
- 7 PHONES (Answering machines also use up electricity)
- 8 GAMING CONSOLE (Keeping multiple consoles plugged in can cost you)
- 9 TELEVISION (The larger the screen, the more energy used)
- 10 MICROWAVES (The clock on your microwave constantly uses energy!)



HOW TO STOP THE VAMPIRES FROM SUCKING YOUR POWER:



SOURCES:

<http://www.homeselfe.com/why-is-my-electric-bill-so-high/>
<http://www.dailyfinance.com/2010/06/10/10-most-costly-appliances/>
<http://247wallst.com/special-report/2012/09/17/the-10-states-that-use-the-most-energy/>
<http://www.forbes.com/sites/williampentland/2011/09/03/top-26-home-energy-hogs-turned-off/>
<https://www.llnl.gov/news/american-energy-use-slightly-carbon-emissions-almost-unchanged-0>