

## **Discovering Energy in your Home**

Today, we'll be examining the different uses of energy in the home. We'll learn where energy comes from, and the difference that the source of your electricity can make. We've prepared a video to watch, an activity to go with it, and a set of links through which you can learn more information!

Link to the video: <https://www.youtube.com/watch?v=3UyvZ3oVZ0c&feature=youtu.be>

### **Activity: Home Energy Audit**

You have learned about how energy gets to your home. Let's talk about you and energy right now! Do you know how you use electricity in your home? This activity will help you discover what devices in your home use the most energy, and what size of power plant you need to power them.

Note: The rate that an appliance uses electricity is measured in watts (W), and the amount of electricity overall is measured in kilowatt-hours, or kWh. One kilowatt-hour means that one appliance used 1000 watts (or 1 kilowatt) of electricity for one hour. To find your daily energy consumption, use the following formula:

$$\text{Hours Used Per Day} \times \text{Wattage in W} \times 1000 = \text{Daily Energy consumption in kWh [1]}$$

Fill out the table below with values from your own home! (Values from [2]):

Appliance	How many do you own?	Active Energy	Vampire Energy	How much energy does that use per day?
		Write the hours you use it and multiply.	Write the hours it is plugged in and not used and multiply.	Add the two columns and multiply by how many you have.
TVs		__ hours X 150 W = _____ Wh	__ hours X 6.4 W = _____ Wh	_____/1000 = _____ kWh
Computers		__ hours X 68 W = _____ Wh	__ hours X 1.2 W = _____ Wh	_____/1000 = _____ kWh
Microwaves		__ hours X 1000 W = _____ Wh	__ hours X 2 W = _____ Wh	_____/1000 = _____ kWh
TV Satellite Systems		__ hours X 25 W = _____ Wh	__ hours X 15 W = _____ Wh	_____/1000 = _____ kWh
Laptop		-	__ hours X 4.5 W	_____/1000

charger			= _____ Wh	= _____ kWh
Phone		__ hours X 4.5 W = _____ Wh	__ hours X 2.2 W = _____ Wh	_____/1000 = _____ kWh
Inkjet Printer		__ hours X 13 = _____ Wh	__ hours X 4.2 = _____ Wh	_____/1000 = _____ kWh
Wifi Transmitter		__ hours X 6 = _____ Wh	__ hours X 2 = _____ Wh	_____/1000 = _____ kWh
Cable Box		__ hours X 140 = _____ Wh	__ hours X 11.6 = _____ Wh	_____/1000 = _____ kWh
Coffeemaker		__ hours X 70 = _____ Wh	-	_____/1000 = _____ kWh
Video game console		__ hours X 20 = = _____ Wh	-	_____/1000 = _____ kWh
Toaster		__ hours X 1100 = _____ Wh	-	_____/1000 = _____ kWh
	Total			

How many solar panels would you need in a year?  
(Multiply the total of the last column by 365, and divide by 5600 [3]).  
You would need \_\_\_\_\_ solar panels.

How much coal would you need in a year?  
(Multiply the total of the last column by 365, divide by 2460 and multiply by 900 [4]).  
You would need \_\_\_\_\_ kilograms of coal.

If you used only coal to fuel your appliances, what would be your total CO2 emissions  
(Multiply your kilograms of coal by 2.6 [4])?  
Your total would be \_\_\_\_\_ kilograms of carbon dioxide emissions.

These numbers probably don't seem very high. But this is only one house, and a few devices in it. Try doing these calculations for every device we missed in our list, and then multiply it by the number of houses in your neighbourhood, or in Toronto (400,000) [5], or in Canada (14,000,000) [6]. For context, about 30% of greenhouse gases are from building operations. Global GHG emissions are approximately 46 megatonnes [7], which is a real unit that means 46,000,000 tonnes of kg CO<sub>2</sub> are released every year.

For more information and for some details behind the number, see the links below:

**More Information:**

Video: How Does Electricity Reach Our Homes?

<https://www.youtube.com/watch?v=s8LzYzYRMOk>

Ontario Energy Distribution Video:

<https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/on-eng.html>

Crash Course: The History of Energy: <https://www.youtube.com/watch?v=EM1IyIyr-Zc>

Crash Course: The Future of Energy: <https://www.youtube.com/watch?v=v6uRuNboy4A>

Crash Course: Renewables: <https://www.youtube.com/watch?v=4k5gyYAAEEU>

**More Technical:**

CECA U of T Blog:

<https://cecaupt.com/2020/04/22/some-interesting-information-about-electricity-generation/>

Green Building and Net Zero Energy <https://www.worldgbc.org/what-green-building>

Ontario Energy Distribution:

<https://www.cer-rec.gc.ca/nrg/ntgrtd/mrkt/nrgsstmprfls/on-eng.html>

**Sources used in the activity and video:**

[1] United States Department of Energy, Estimate Appliance and Home Electronic Energy Use

<https://www.energy.gov/energysaver/save-electricity-and-fuel/appliances-and-electronics/estimating-appliance-and-home>

[2] Home Energy Saver and Score, Default Energy Consumption

<http://hes-documentation.lbl.gov/calculation-methodology/calculation-of-energy-consumption/major-appliances/miscellaneous-equipment-energy-consumption/default-energy-consumption-of-mels>

[3]SunMetrix, Should I get solar panels in Toronto?

<https://sunmetrix.com/should-i-get-solar-panels-in-canada/Toronto/>

[4] Howstuffworks, How much coal is required to run a 100-watt light bulb 24 hours a day for a year?

<https://science.howstuffworks.com/environmental/energy/question481.htm>

[5] City of Toronto, Toronto at a glance

<https://www.toronto.ca/city-government/data-research-maps/toronto-at-a-glance/>

[6] Statistics Canada, 2016 Census data on Households.

<https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=PR&Code1=01&Geo2=PR&Code2=01&Data=Count&SearchText=Canada&SearchType=Begins&SearchPR=01&B1=Families,%20households%20and%20marital%20status&TABID=1>

[7] Government of Canada, Global Greenhouse Gas Emission

<https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/global-greenhouse-gas-emissions.html>

[8] Eurostat, EU Energy Consumption Infographic

<https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20190620-1>