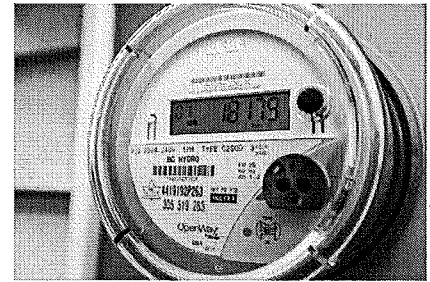


# Lesson 4: The Kwh, Another Measure of Energy

## How do we measure Energy?

Energy can be measured in Joules (J) or the kilowatt-hour. The relationship between the kwh and J is shown below through an example.

The scenario is that a 1000 W light bulb is on for an hour. How much energy does it use in that time? Two separate calculations will be done below



$$1000 \text{ W} = 1\text{kw}$$

$$3600 \text{ seconds in one hour}$$

$$P = W/t$$

Or

$$W = P \times t$$

$$W = P \times t$$

$$W = 1000\text{W} \times 3600\text{s}$$

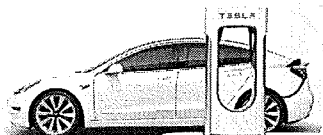
$$\text{Work (energy)} = 3.6 \times 10^6 \text{ J}$$

$$W = P \times t$$

$$W = 1\text{Kw} \times 1\text{h}$$

$$\text{Work (energy)} = 1\text{kwh}$$

$$3.6 \times 10^6 \text{ J} = 1\text{kwh}$$



Canada

## ENERGUIDE

Energy consumption / Consommation énergétique

# 300 kWh

per year / par année

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Type 3

Uses least energy / Consomme le moins d'énergie	Uses most energy / Consomme le plus d'énergie
Embodied energy comparé	Modèles similaires comparés
Model number Numéro du modèle	16.5 - 18.4 volume in ft <sup>3</sup> volume en pi <sup>3</sup> 00000

\*Based on the following: 1.20 kWh per kWh of electricity, 0.0001 kWh per kWh of natural gas, 0.0001 kWh per kWh of propane, 0.0001 kWh per kWh of oil, 0.0001 kWh per kWh of coal.

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The ENERGY STAR® mark on the Electrical Meter symbolizes that the meter is ENERGY STAR qualified. It means the meter is designed to be energy efficient. The ENERGY STAR mark is a symbol of energy efficiency. The ENERGY STAR mark is a symbol of energy efficiency. The ENERGY STAR mark is a symbol of energy efficiency.

## Additional Practice

1. Convert the following into kilowatts:

a) 1500 W  $\frac{1500}{1000} = 1.5 \text{ kW}$

b) 25.0 W  $\frac{25.0}{1000} = 0.025 \text{ kW}$

c) 1670000 W  $\frac{1670000}{1000} = 1670 \text{ kW}$

2. Determine the total kilowatt hours for the following:

a) 3000W heater on for 3 hours.  $\frac{3000\text{W}}{1000} = 3\text{kw} \times 3\text{hr} = 9 \text{ kWhr}$

b) 1500W water pump on for 5 hours a day 7 days a week for 2 weeks.

$$\frac{1500\text{W}}{1000} = 1.5\text{kw} \times (5\text{hrs} \times 14\text{days}) = 105 \text{ kWhr}$$

3. Determine the total cost of operating a 2000W heater for 4 hours a day, 5 days a week for 8 weeks. The cost of one kilowatt hour is \$0.14.

$$\frac{2000\text{W}}{1000} = 2\text{kw} \times (4\text{hrs} \times 5\text{days} \times 8\text{weeks}) = 320 \text{ kWhr}$$

$$320 \text{ kWhr} \times 0.14 \text{ \$/kWhr} = \$44.8$$

4. If operating a 2000W stove for 2 months is \$10.50 and the cost per kwh is \$0.14, how long was the stove on during those 2 months?

$$\frac{\$10.50}{0.14 \text{ \$/kWhr}} = 75 \text{ kWhr}$$

$$2000\text{W} = 2\text{kw}$$

$$\frac{75 \text{ kWhr}}{2\text{kw}} = 37.5 \text{ hrs}$$

5. An LED lightbulb is rated at 14 Watts and is left on for eight hours in a day. Determine how much it would cost to keep the light on for one month (30 days) if the cost of electricity is 14 cents per kiloWatt hour.

$$14\text{W} \times 8 \text{ hrs} \times 30\text{days} = \frac{3360 \text{ watt}\cdot\text{hr}}{1000} = 3.36 \text{ kWhr}$$

$$3.36 \text{ kWhr} \times 0.14 \text{ \$/kWhr} = \$0.47$$

6. An electric car charger is rated for 7,700W and runs for 90 minutes each night after a typical day of driving. If electricity costs \$0.14 per Kwhr what is the cost of charging nightly?

$$\frac{7700W}{1000} = 7.7kW \times \left(\frac{90min}{60}\right) = 11.55 kwhr$$

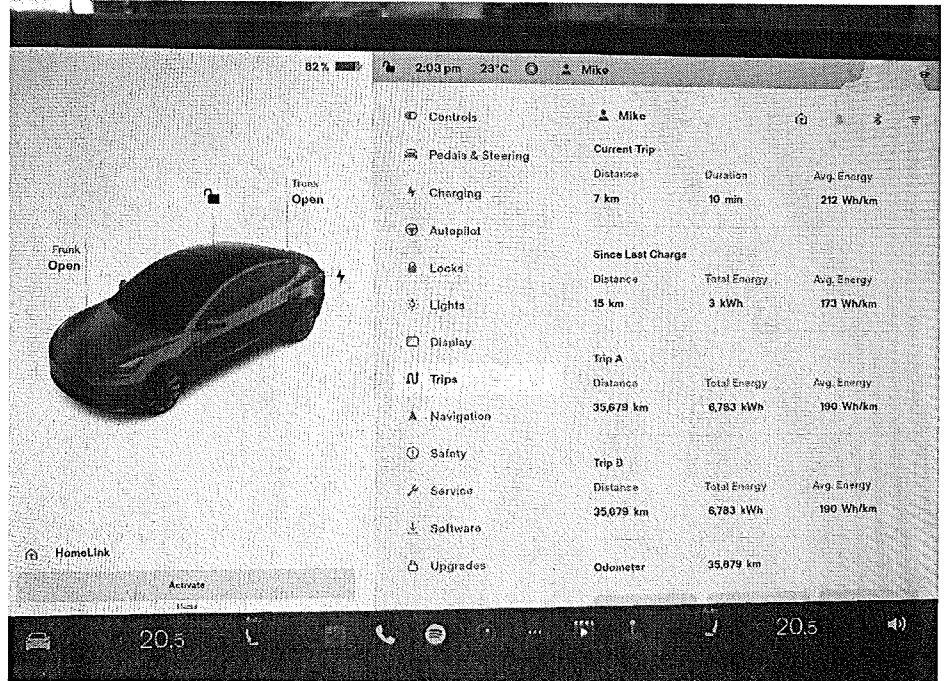
$$11.55 kwhr \times 0.14 \$/kwhr = \$1.62$$

7. (BONUS) Compare the cost for driving my car over the course of two years (35,679 km and 6,783 Kwhr) given that electricity costs \$0.14 per Kwhr and my previous car averaged 12L/100 km on premium gas. Use the average price for premium gas today in your calculations.

Electricity Cost       $6,783 kwhr \times 0.14 \$/kwhr = \$949.62$

Gas Cost       $\frac{35,679 km}{1} \times \frac{12L}{100 km} = 4281.48L \times 2.079 \$/L = \$8901$

Sample cost for premium gas is \$2.079/L



total savings  
 $= \$8901 - 949.62$   
\$7952 saved