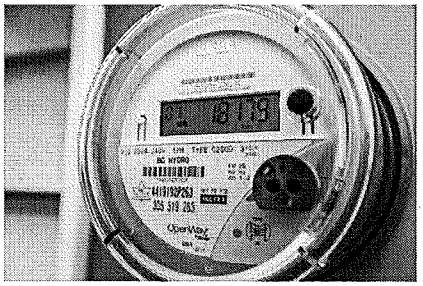
Lesson 4: The Kwh, Another Measure of Energy



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 W = 1kw
3600 seconds in one hour

P = W/t

Or

W = P x t

W = P x t

W = 1000W x 3600s

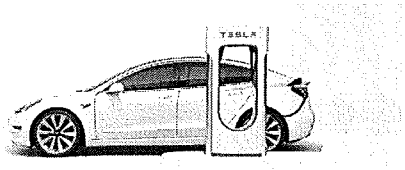
Work (energy) = 3.6 x 10^6 J

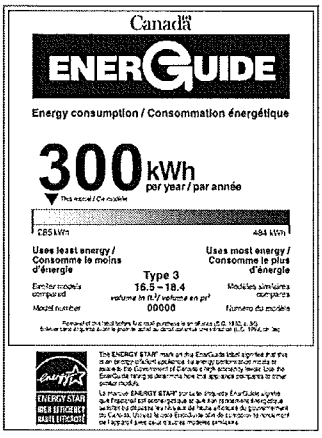
W = P x t

W = 1Kw x 1h

Work (energy) = 1kwh

3.6 x 10^6 J = 1kwh





Additional Practice

1. Convert the following into kilowatts:

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

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

   c) 1670,000 W $\frac{1670000}{1000} = 1670\ kw$

2. Determine the total kilowatt hours for the following:

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

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

$\frac{1500w}{1000} = 1.5\ kw \times (5hrs \times 14days) = 105\ kwhr$

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.

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

$320\ kwhr \times 0.14\ \#/kwhr \quad \# 44.8$

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?

$2000w = 2kw$

$\frac{\#10.50}{.14\#/kwhr} = 75\ kwhr$

$\frac{75\ kwhr}{2\ kw} = 37.5\ hrs$

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.

$14w \times 8\ hrs \times 30\ days = \frac{3360\ watt \cdot hr}{1000} = 3.36\ kwhr$

$3.36\ kwhr \times 0.14\ \#/kwhr = \#0.47$

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?

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

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

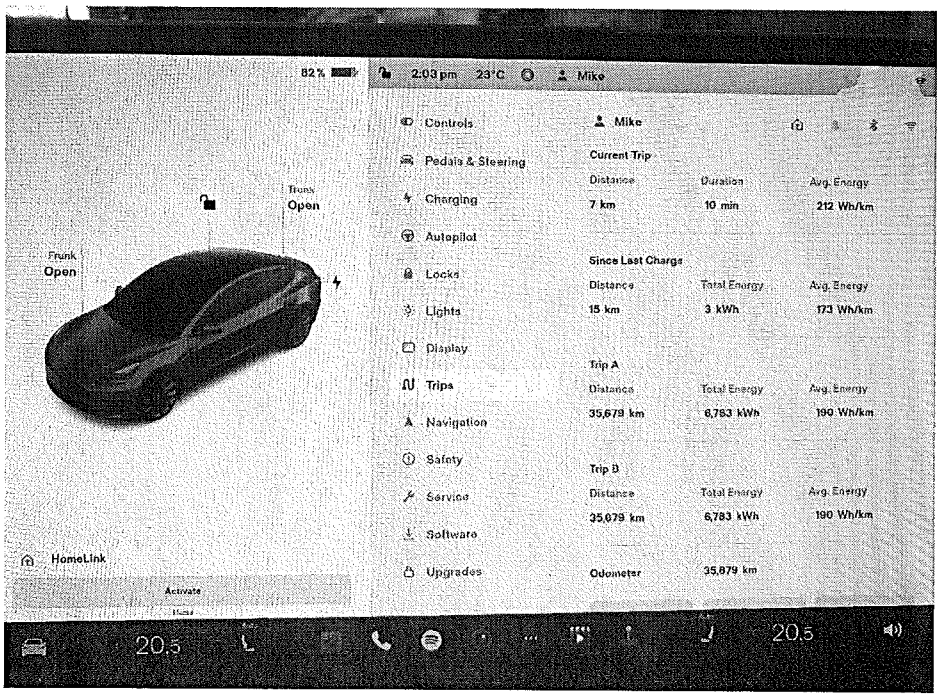
7. (**BONUS**) Compare the cost for driving my car over the course of two years (35,679 km and 6,783 Kwhr) given that electricity costs $0.14 per Kwhr and my previous car averaged 12L/100 km on premium gas. Use the average price for premium gas today in your calculations.

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