

A Larger Unit for Energy

As you can see in the example on the previous page, a 1200 W hair dryer used for only 5.0 min consumes 260 000 J of energy. Could you imagine how many joules of electrical energy are consumed by all the electric devices in your home in one day? In terms of electrical energy, the joule is a very small amount.

$$1.0 \text{ joule} = 1.0 \text{ watt} \times 1.0 \text{ second}$$

You can also use a larger unit of electrical energy. To increase this measurement, power is measured in kilowatts (kW) and time is measured in hours (h). There are 1000 W in 1 kW and 3600 s in 1 h. A kilowatt-hour (kW·h) is the product of power in kilowatts and time in hours.

$$1.0 \text{ kilowatt-hour} = 1.0 \text{ kilowatt} \times 1.0 \text{ hour}$$

or

$$1.0 \text{ kW}\cdot\text{h} = 1.0 \text{ kW} \times 1.0 \text{ h}$$

Figure 9.16 shows the energy label on an electric appliance. Instead of giving the energy consumption in joules, the kilowatt-hour is used.

Paying for Electricity

The power company that supplies electricity to your home keeps track of the electrical energy you consume. Your home probably has a meter similar to the one in Figure 9.17 that monitors your energy consumption. Every time you turn on a load, such as a light bulb, current passes through the meter and turns the dials. An employee of the power company visits your home and reads this meter to determine how much energy has been consumed since the last bill. These meters represent the energy consumed in kilowatt-hours. When you receive your electricity bill, you are charged for each kilowatt-hour of electrical energy you have used.

For example, suppose a family uses 1500 kW·h of electrical energy in a given month. If the power company charges 7 cents for every kW·h of energy, how much is the electric bill for the month?

$$\text{cost of energy used} = \frac{\$0.07}{1 \text{ kW}\cdot\text{h}} \times 1500 \text{ kW}\cdot\text{h} = \$105.00$$

The family will owe the electric company \$105.00 for the electrical energy it used.

Did You Know?

More than 52 billion kW·h of electrical energy is used in British Columbia each year.



Figure 9.16 The energy label shows the average annual energy consumption in kilowatt-hours.



Figure 9.17 The electricity meter in your home may be similar to this one. The middle disk turns, showing the rate at which electrical energy is being used within the home.

internet connect

To find out more about reading a home electricity meter, go to www.bcsience9.ca.

9-2B The Cost of Electricity

Think About It

In this activity, you will use the power rating and time of use to calculate the energy consumption and cost of operating specific devices.

What to Do

1. Copy the following data table in your notebook. Give your data table a title.

Appliance	Power (W)	Time of Use Each Day (h)	Energy (kW·h)	Cost (cents)	Cost (dollars)
Television	200	2.0			
Stereo	80	1.5			
Kitchen stove	12 000	2.0			
Microwave	1 400	0.5			
Bedroom light	100	4.0			

2. Calculate the energy consumed, in kilowatt-hours, by each of the appliances. Be sure to change the power in watts to kilowatts.
3. Using the cost of electricity as 7 cents per kilowatt-hour, calculate the daily cost of each appliance in cents and in dollars.

What Did You Find Out?

1. Which appliance had the greatest daily cost?
2. Considering all the electrical devices in your home, state which ones you think would have the greatest daily cost.