

WHAT IS A KILOWATT? WHAT IS A KILOWATT-HOUR?

Analogy and Examples

Analogy

The speed of a car is a measure of the rate at which a car travels across land; measured in kilometers per hour (km/h).

The wattage of an appliance is a measure of the rate at which an appliance consumes or produces electric energy; measured in watts (W) or joules per second (J/s). 1 W equals 1 J/s.

To determine the total distance (i.e. how many kilometers) a car has travelled in a given amount of time, you must multiply the speed of the car by the amount of time the car travels.

To determine the total amount of electric energy (i.e. how many Watt-hours (Wh)) an appliance consumes or produces in a given amount of time, you must multiply the wattage of the appliance by the amount of time the appliance operates.

Example

If a car's speed is 60 km/hr and the car travels for 3 hours, it will travel 180 kilometers.

$$60 \text{ km/h} \times 3 \text{ h} = 180 \text{ km}$$

If a ceiling fan's wattage is 60 Watts (i.e. the ceiling fan consumes 60 joules of energy per second) and the fan runs for 3 hours (i.e. 3,600 seconds), it will consume 180 Watt-hours (i.e. 216,000 joules).

$$\begin{aligned} 60 \text{ W} \times 3 \text{ h} &= 180 \text{ Wh} \\ \text{or} \\ 60 \text{ J/s} \times 3,600 \text{ s} &= 216,000 \text{ J} \end{aligned}$$

Many appliances consume or produce thousands of Watt-hours per year, and so the more commonly used unit is the kilowatt-hour (kWh). A kilowatt-hour is equal to 1,000 Watt-hours. Your local utility bills you for the number of kilowatt-hours of energy that you consume.

Example

The size of an electricity-producing solar energy system (i.e. photovoltaic system) is expressed in terms of the wattage of the system. A 3kW photovoltaic system has the capacity to produce 3kW of energy (i.e. 3,000 J/s).

Depending on sun exposure, a 3kW photovoltaic system can be expected to generate approximately 4,000 kWh of energy per year (EcoAlternative Energy, 2008) (ARISE Technologies Corporation, 2008).

4,000 kWh is enough energy to power 2 refrigerators, 1 chest freezer, 1 range, 1 dishwasher, 1 clothes washer, and 1 clothes dryer for 1 year. (Natural Resources Canada, 2007)



(Better Home Improvement, 2009)



(Clip Art, 2007)

