

# Chapter 14

## Energy and Power Fundamentals



*Energy*: the ability to do work, also a quantity or volume of fuel. The rate at which energy is used is called power. Energy is measured in joules. For example, an energy supply providing one joule per second gives one watt of power. Thus a 60-watt bulb provides 60 joules each second.

1 kilowatt-hour (kWh) = 3,600,000 joules energy provided over 1 h

1 kilowatt-hour (kWh) = 3600 kilo joules = 3.6 mega joules

*Energy density*: the amount of energy that can be contained in a given unit of volume, area, or mass. It is typically expressed in joules per kilogram.

*Joule (J)*: a unit of energy, whereby 1 joule = 1 watt-second; the energy exerted by the force of 1 Newton acting to move a mass of 1 kg a distance of 1 m.

*Power*: the rate at which energy is used or at which work gets done. Power is measured in watts, after the inventor of the modern steam engine, the Scotsman James Watt (1736–1819).

*Power density*: the amount of power that can be harnessed in a given unit of volume, area, or mass. The comparison of renewable energy sources to other sources is typically done in watts per square meter.

*Watt*: a unit of power. By definition, 1 watt = 1 joule per second.

*Energy conservation law*: a fundamental law of physics.

*Capacity factor*: actual amount of energy produced per year divided by the maximum possible energy.