

Learn All About Energy Units and How They're Used

Energy is all around us. To use it optimally, we quantify it and measure its rate of consumption (power). But consumers, engineers and scientists all use very different units of measurement when talking about energy. This infographic sums up the main units, with a few real-life examples to help you understand the scale.

Power of a Machine

The power of a machine is the energy that it supplies or consumes per second. It measures a rate at a given moment. It's like the flow of water from a faucet depending on how much it's turned on.

Watt



The power of a machine that supplies 1 joule of energy per second.

Watt peak



The same as a watt, only it specifies the maximum power that the machine can supply. It is mainly used for solar power.

Watt thermal



The same as a watt, only it specifies that the power is supplied in the form of heat.

Watt electrical



The same as a watt, only it specifies that the power is supplied in the form of electricity.

Horsepower



Obsolete unit dating back to the time of steam engines. It is still used in the automotive industry, albeit with different standards.

Energy Quantities

The quantity of energy is how much is produced or consumed over a given period (e.g., 1 hour). It's like the amount of water that comes out of a faucet left on for a certain time.

Joule



The work done when a force acts on a mass of 1 kilogram through a distance of 1 meter. The joule is a base unit representing a tiny amount by everyday standards. Other more suitable units are commonly used.

Calorie



The quantity of heat required to raise the temperature of 1 gram of water by 1 degree Celsius at standard atmospheric pressure. It is often used in nutrition. Energy content of food = amount of heat released when burned.

Watt-hour



The energy produced or consumed by a machine with a power rating of 1 watt for 1 hour.

British thermal unit



Anglo-American unit used in the natural gas and air conditioning industries. 1 million BTU = 293 kWh

Ton of oil equivalent



The amount of energy released by burning 1 metric ton of crude oil. 1 toe = 11,630 kWh

Ton of coal equivalent



The amount of energy released by burning 1 metric ton of coal. 1 tce = 0.7 toe

Barrel of oil equivalent



The amount of energy released by burning one barrel of crude oil. 1 barrel (bbl) = 158,99 liters = 42 U.S. gallons

A Few Examples

Below are a few examples to help you figure out the power rating of a variety of well-known things, how much energy they produce or consume in a year, and how to read energy labels.



Energy-saving light bulb

Power rating: **12 W** (old-fashioned incandescent bulb = **60 W**)
Energy consumption: **12 kWh/year** (average usage)

Laptop

Power rating: **130 W**

Energy consumption: **174 kWh/year** (usage of 4 hours per day)



Eiffel Tower

Energy consumption: **7,500 MWh/year** (of which **580 MWh** for the lights)

75 square meter apartment

Energy consumption for heating and hot water: **9,800 kWh/year**



Microwave

Power rating: **1,125 W**
Energy consumption: **81 kWh/year** (average usage)



Calorie needs for an adult

2,000 to 3,000 cal/day

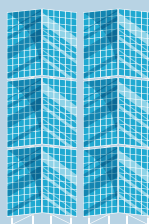


100 gram banana

Energy content: **89 cal**

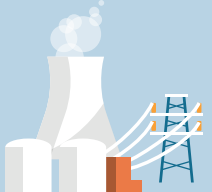
Cestas Solar Park (France)

Power rating: **300 MWp**
Average output: **350 GWh/year**



Standard nuclear reactor

Power rating: **900 MW**
Average output: **6,000 GWh/year**



City of 100,000 residents (France)

Energy consumption: roughly **415 GWh/year**



A Quick Guide to Counting Energy Multiples

Prefix	Multiplied by	Symbol	Example in watts
kilo	1,000	k	kilowatt (kW)
mega	1 million	M	megawatt (MW)
giga	1 billion (= 1,000 million)	G	gigawatt (GW)
tera	1 trillion (= 1,000 billion)	T	terawatt (TW)