## Power vs Energy

**Power and Energy are Closely Related but NOT SYNONYMS. KNOWING THE DIFFERENCE BETWEEN THEM IS IMPORTANT IN MAKING DECISIONS ABOUT THE TRANSITION TO A LOW-CARBON ECONOMY.**

**Watts** (Instantaneous Rate of Energy)

- A 100-watt light bulb consumes 100 watt-hours per hour.

**Watt-hours** (Total Amount of Energy)

- A 13-volt lead battery stores 1200 watt-hours of energy.

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### Electricity Capacity

The term capacity describes the amount of electricity that would flow if it were not limited by factors such as maximum load or maximum demand. It is measured in MW. Here, we’re talking about power. When the wind doesn’t blow or the sun doesn’t shine, the electricity provided from wind turbines or solar panels is diminished, or even halted. It is the term used to describe the amount of electricity that a source, such as wind and solar, is able to output at any given time.

**Power** is how much energy is transmitted over one second. Its unit is called the watt.

**Energy** just means the ability to do work, to push or pull... something a distance.

The ratio of what a plant actually generates to its nameplate capacity is called its capacity factor. It is measured in percent. For wind farms and solar farms, this value is much closer to their full capacity because it is only the weather that limits how much energy they can produce. For bases using non-variable sources of energy such as coal, gas, hydro or nuclear, this capacity factor is much lower because these technologies need to be online all day and all night and, therefore, cannot be shut down unless there is no energy demand. The lower the capacity factor, the higher costs for unused capacity.

**Storage** is also measured in MWh because the electricity has to be produced at a certain point in the future, even if it isn’t needed immediately. Storage can be in the form of gas, hydrogen, batteries or other technologies that can be turned on and off as needed. This can mean the curtailment of wind or more sun than we need.

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**Electricity Generation** (A.K.A. Supply)

In principle, we can store some of the excess electricity from variable renewable energy sources to be used later. This can be done with batteries or by storing energy in the form of gas, hydrogen or other technologies. But the amount of reservoir we need to “keep the lights on” at hospitals, factories and all the rest of a modern society is considerable.

**Carbon footprint** is the total amount of greenhouse gas emissions associated with a given product, activity or person. It is measured in kg CO₂eq. It is a measure of the amount of energy consumed over a certain period of time. The term “carbon footprint” is often used to describe the total amount of greenhouse gases that a person or organization emits through their everyday activities.

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### And Another Bit of Jargon: Capacity Factor

The term “capacity factor” describes the amount of electricity that would flow from a power plant if it were not limited by factors such as maximum load or maximum demand. It is measured in percent.