Wind Energy Math Calculations

Helpful Units and Conversions

Power (The rate at which work is performed or energy is transmitted)

Watt (W): 1 W = 1 $\frac{J}{s}$ = 1 kg x $\frac{m^2}{s^3}$ *1 watt = 1 Ampere x 1 Volt*

Kilowatt (kW) = 1,000 Watts
Megawatt (MW) = 1,000 Kilowatts = 1,000,000 Watts

Energy (The work done to produce power over a period of time)

Joule (J): 1 $\frac{m^2}{s^2}$ J = 1 kg x

A Joule is the work done to produce one Watt continuously for one second.

Kilowatt-Hour (kWh): This is the amount of work done to produce one Kilowatt continuously for one hour. This is the unit that electricity is usually measured by. Americans typically pay 8—20 cents per kWh.

1 kWh = 1,000 Watt-Hours = 3,600,000 J = 3.6 megajoules

Electricity

Ampere (A): Also called "Amp" - The unit of electrical *current*—The amount of electric charge per second. One ampere is approximately equivalent to 6.2415×10^{18} elementary charges, such as electrons, moving past a boundary in one second.

Volt (V): The unit of electric potential difference. One volt is equal to one Joule of energy per coulomb of charge (1V = J/C)

Remember: **Watts = Amps x Volts**
A good analogy compares electric circuits to water-filled pipes (like a hose). In this analogy, Current (amperes) is a measure of the volume of water that flows past a given point (how WIDE is the pipe?). Voltage would be the water pressure—how fast the water is moving through the pipe.
So current measures how many electrons are moving through a circuit, while voltage measures how fast they travel.

Coulomb (C): The unit of electric charge. One coulomb = 6.2415×10^{18} elementary charges (i.e. electrons).

1 meter = 3.28 feet

1 meter/second = 2.237 miles per hour