

Know the Difference



Have you ever wondered what a kiloWatt or a kiloWatt-hour is? Quite simply a **kilo-Watt (kW):** Is 1000 watts

which is equivalent to 3.6 megajoules and a **kiloWatt-hour (kWh):** Is one kilowatt (1 kW or 1000 watts) used in an hour. To paraphrase one is a unit to help measure the capacity of a battery and the other is to measure the rate of power used in an hour. The value of knowing this can help you determine how quickly you can charge your car as well as gauging your battery Life. For Electric Vehicle (EV) owners it is important to know the difference because it will tell you how big your battery is, how quickly you can charge your EV and how far you can drive on a single charge.

Equations for Calculating kiloWatt-hours

$$P(\text{kiloWatt-hours}) = [\text{Power Factor} \times I(\text{Amps}) \times V(\text{Volts}) / 1000] \times T(\text{hours})$$

$$P = I^2 \times R (\text{Ohms})$$

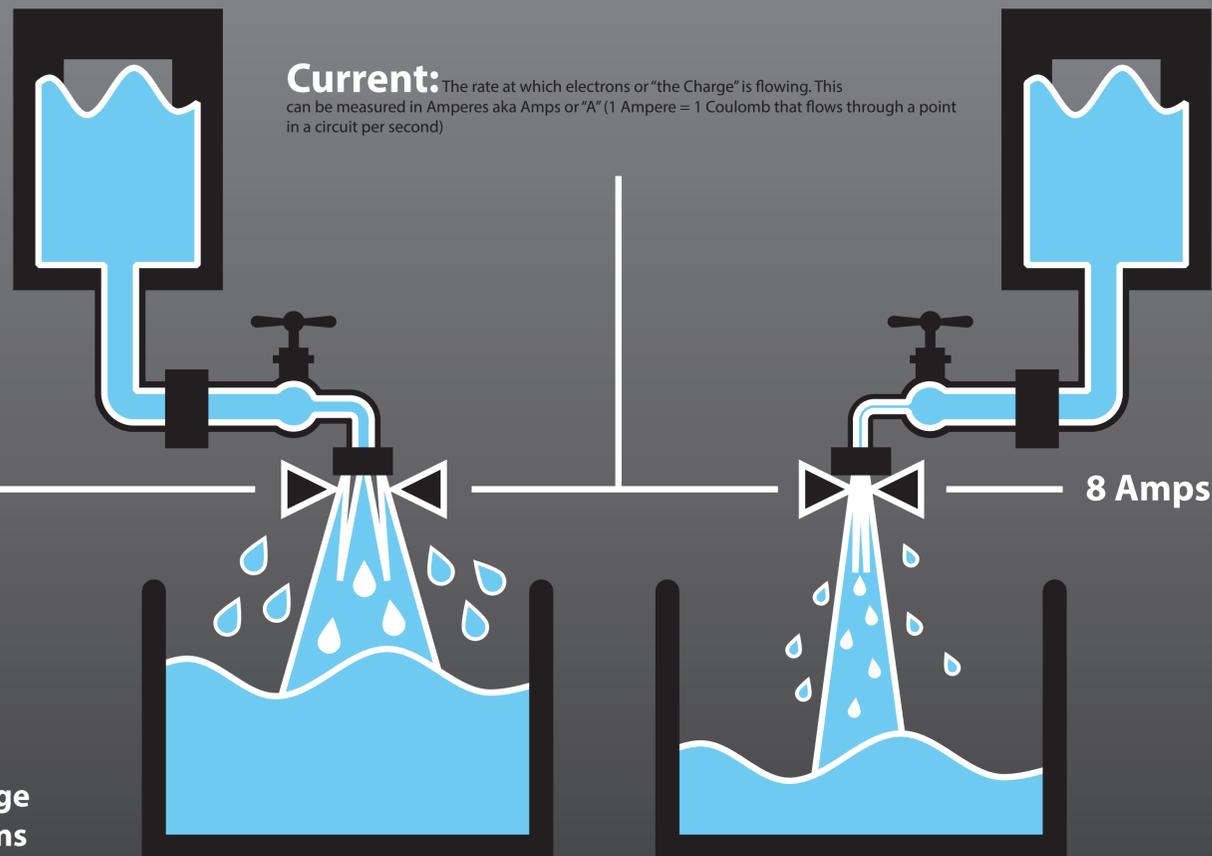
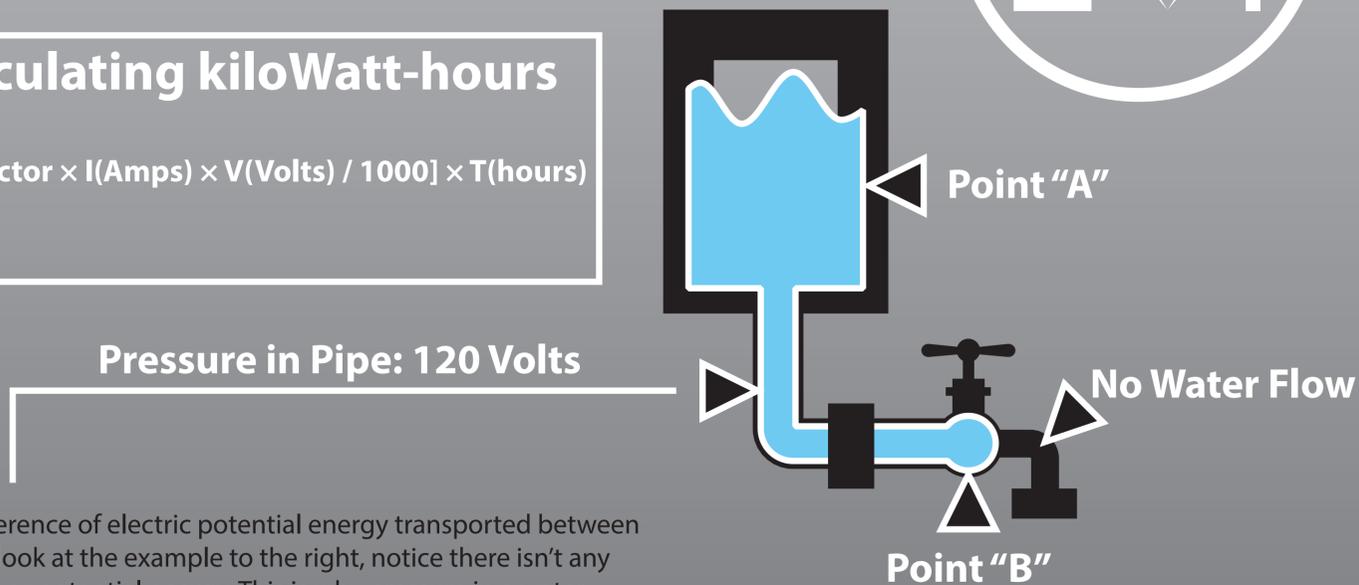
$$P = E^2 / R$$

Watt: Is a unit of power, equivalent to one joule per second, corresponding to the power in an electric circuit in which the potential difference is one volt and the current one ampere.

kilo-Watt (kW): equivalent to 1000 watts.

kiloWatt-hour (kWh): Is one kilowatt (1 kW or 1000 watts) used in an hour which is equivalent to 3.6 megajoules.

Voltage: The electric energy charge difference of electric potential energy transported between two points (point "A" and point "B") on a circuit. If you look at the example to the right, notice there isn't any water flow, that's because voltage is all about pressure or potential energy. This is why pressure in a water pipe can be considered analogous to voltage.



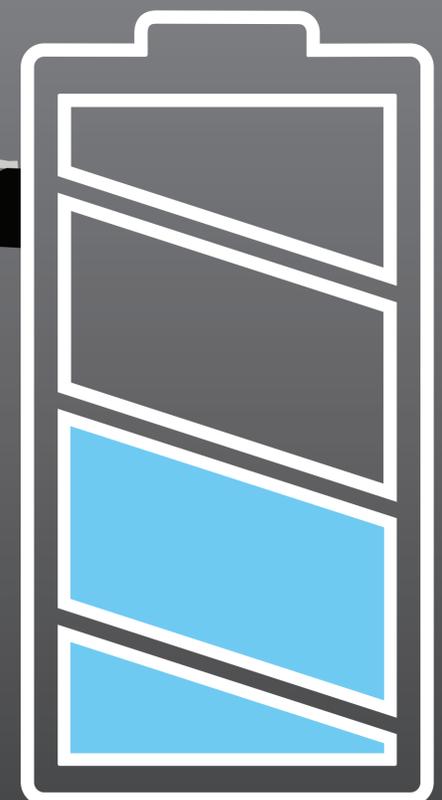
*Water represents Charge or Coulombs or Electrons



Application: Charging a Battery

$$240 \text{ Volts} \times 30 \text{ Amps} = 7200 \text{ Watts or } 7.2 \text{ kW}$$

If we use the 7.2 kWh rate it would take 12.5 hours to fill charge a 90 kWh battery



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