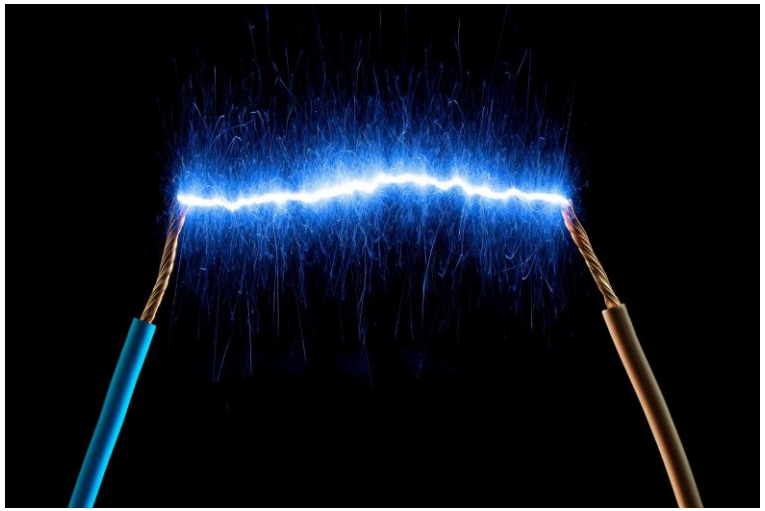
Eversource Energy

Electricity Curriculum

What is Electricity?

- Electricity is the flow of electrical power or charge. Electricity is both a basic part of nature and one of the most widely used forms of energy.
- Electricity is defined as the flow of electrons through a wire or solution.
- Electricity is converted to other forms of energy like heat or motion within the appliances we use.



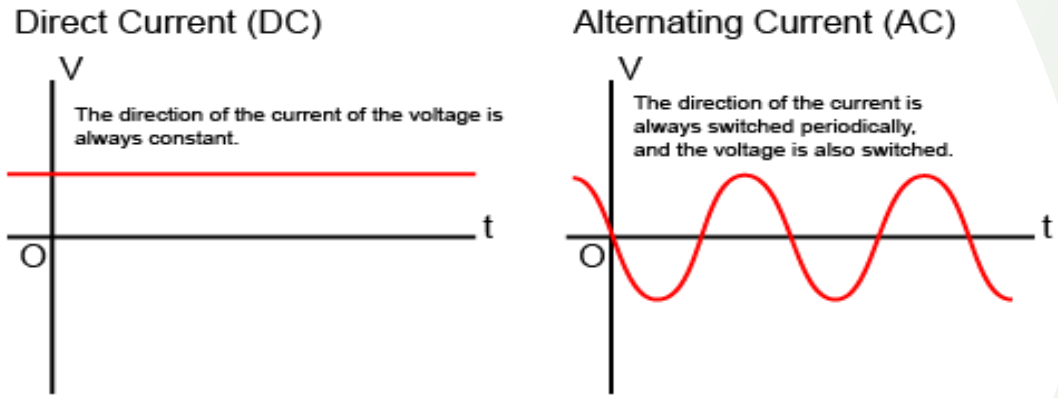
How does electricity move?

Voltage!

- Voltage is the electrical property that causes an electric current to flow. Voltage is produced by a generator. Batteries also provide voltage.

Current!

- An electric current is a stream of charged particles, such as electrons or ions, moving through an electrical conductor or space.



Types of Electric Current

Electric circuits operate using one of the two types of current:

- AC - Alternating Current is an electric current which periodically reverses direction and changes its magnitude. AC is most effective for delivery of power to houses, office buildings, etc.
- DC - Direct Current is one-directional flow of electric charge. An example of DC is a battery. Electronic devices typically use DC.

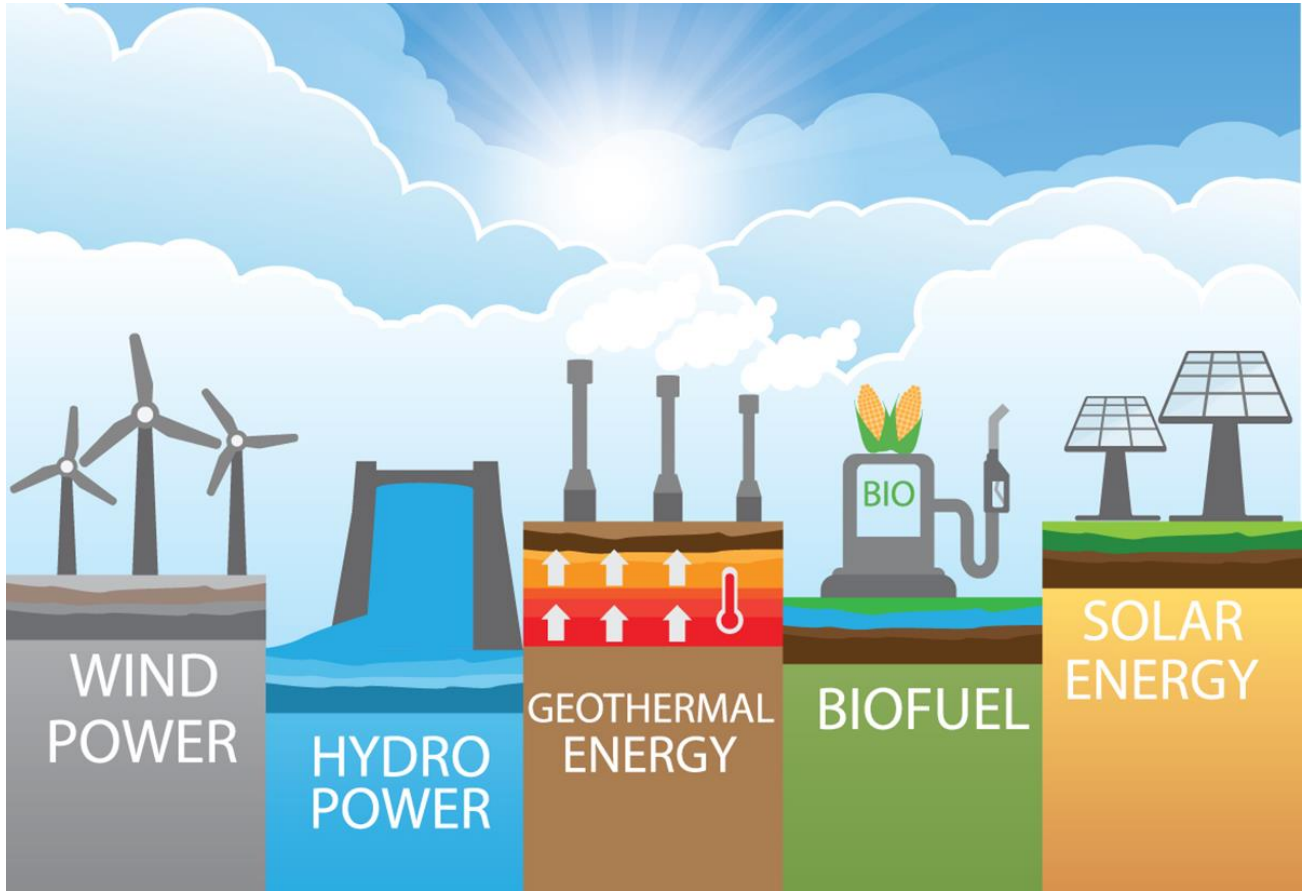
What creates Electricity?

GENERATION:

- Electricity is produced when certain forces (mechanical, magnetic, or heat) interact with energy resources, such as fossil fuels, solar or wind.
- Various processes convert the potential energy from these resources to electric current, which is the movement of charged particles.

Examples of Electricity Generation

- Energy Sources!
- Most electricity is generated using fossil fuels, nuclear energy, and renewable resources.
- Renewable resources include wind, hydro, and solar, to name a few.



Scale of Electrical Generation

Small Scale

- Includes generators with less than 1 Megawatt* (MW) of generating capacity. These are usually located at or near where the electricity is consumed. For example, solar panels on homes would be considered small scale.

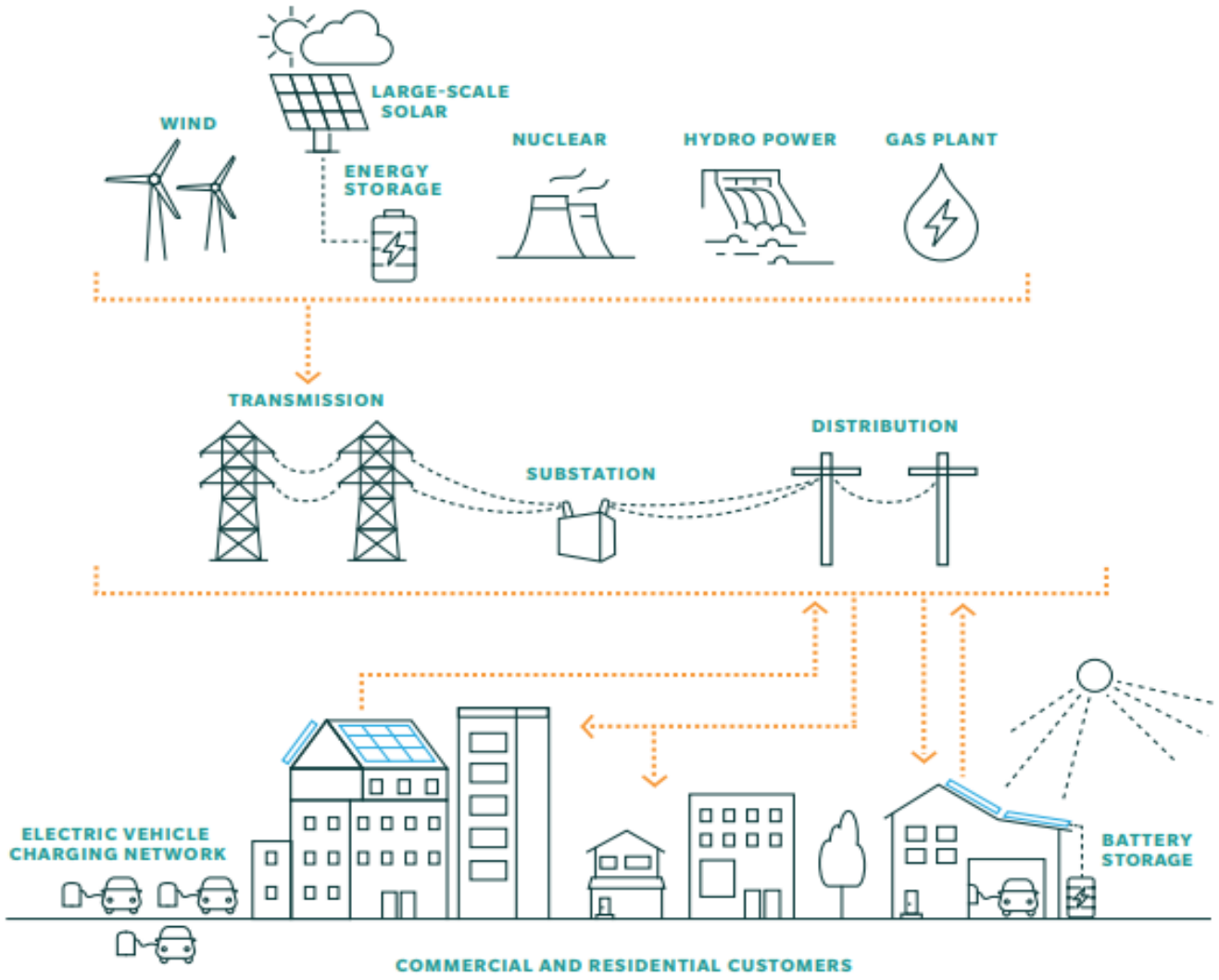
Large Scale

- Utility scale includes electricity generation and capacity of electric power plants with at least 1 MW* of total electricity generation capacity.

*1 MW can power 400 to 900 homes.

The Electric Grid

- Utility scale generation is interconnected across New England and across the country by way of high-voltage transmission lines.
- All of these lines networked together create a type of superhighway that moves electricity from the power plants to electric substations and local distribution systems, which ultimately deliver it to homes and businesses.
- The combination of these components is what we call the US electric grid.

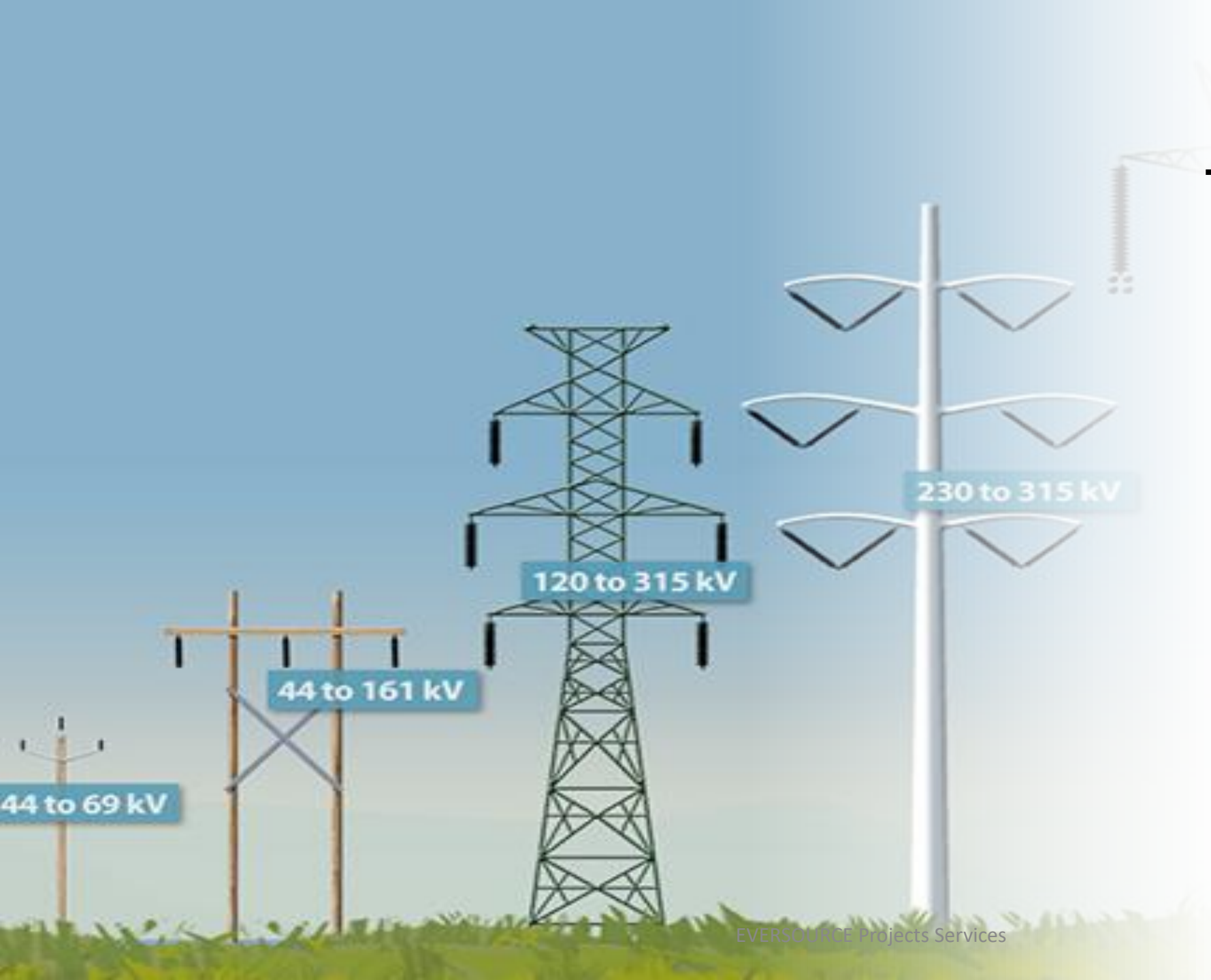

LARGE-SCALE SOLAR
WIND
ENERGY STORAGE
NUCLEAR
HYDRO POWER
GAS PLANT
TRANSMISSION
SUBSTATION
DISTRIBUTION
ELECTRIC VEHICLE CHARGING NETWORK
BATTERY STORAGE
COMMERCIAL AND RESIDENTIAL CUSTOMERS

EVERSOURCE ENERGY

Eversource's Electric Transmission System

- Overhead
- Underground
- Electrical Substations

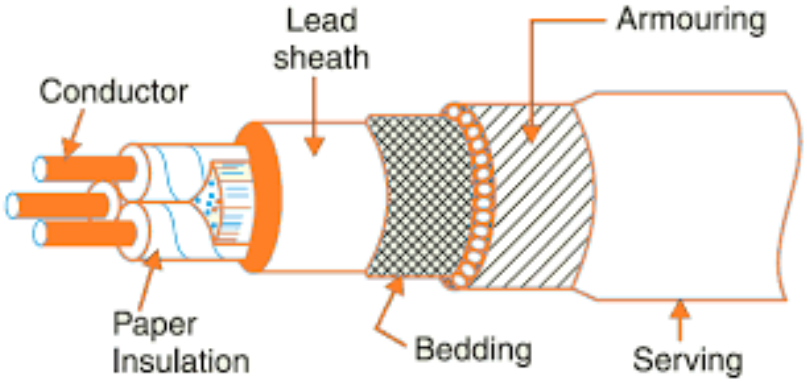
Overhead Transmission Lines



- Eversource's overhead transmission lines operate as high as 345,000 volts to transmit bulk power.
- They must be high voltage in order to minimize power losses as the electricity travels long distances from where it is generated to where it is used.

Underground Transmission Lines

- Underground lines are used to transport power through populated areas, underwater, or almost anywhere that overhead lines can't be used.



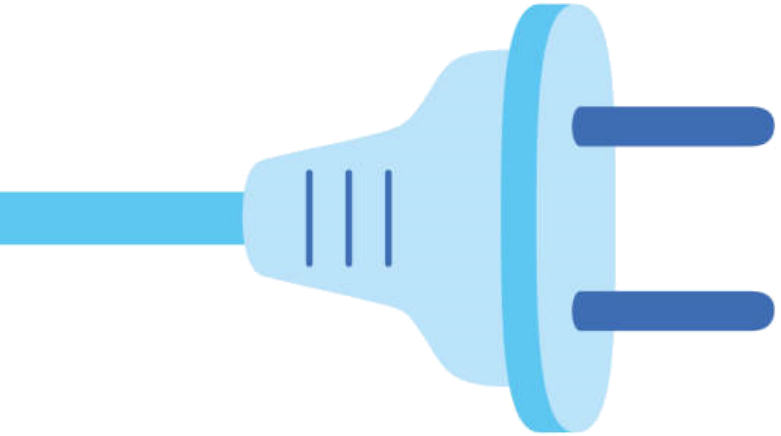
Substations

Electric substations

- are the interface between the transmission and distribution systems.
- contain equipment that serves to lower the transmission voltage and distribute power to consumers through distribution circuits
- are the hub for power flow to the consumers for the community in which it is located.

Substation Equipment

- The substation transformer adds energy capacity for the community in which it is located.
- Circuit breakers and a variety of protection & control equipment, help assure the substation operates safely and efficiently.
- Equipment redundancy allows the ability to redirect power flow to assure reliability if equipment fails.



From Generation to the Consumer

- The electric energy originating at small- and large-scale generating sources reaches your home by way of the Eversource transmission and distribution lines.
- The substations are essential. They monitor energy flow, provide system protection, and assure reliability.

Questions?

Contact Information

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