Electricity

Electricity is the flow of electrical power or charge. It is a secondary energy source because it is converted from another (primary) source of energy, such as coal, natural gas, oil, nuclear or renewable sources. Electricity can be made from either renewable or non-renewable energy sources, but it is neither renewable nor non-renewable since it is a secondary source.

Electricity has grown in technological leaps and bounds ever since 1752, when Benjamin Franklin flew a kite with a metal key tied to the string during a thunderstorm to prove that lightning was electric.

Today, it is a necessary component to our fast-moving society.

How Electricity Works

Everything we touch is made up of matter, and matter is made up of tiny "building blocks" of atoms. Within the atoms are even smaller, electrically charged particles called electrons. The movement of the electrons creates electricity. Electrons transmit an electrical charge through solid matter (such as metal) to produce an electrical current. The number of electrons moving in an electrical circuit is called "amperage," or current, measured in amps. The pressure pushing the electrons is "voltage," measured in volts. Electricity travels at the speed of light, more than 186,000 miles (299,338 kilometers) per second.

And how is electricity moved from where it is created to where people need to use it? Transformers (electric devices that move electric energy from one set of circuits to another) are used to efficiently transmit electricity over long distances. This makes it possible to supply electricity to homes and businesses located far from an electric generating plant. The electricity produced by a generator travels along cables to a transformer, which changes electricity from low voltage to high voltage. Transmission lines are used to carry the electricity to a substation. Substations have transformers that change the high-voltage electricity into lower-voltage electricity. From the substation, distribution lines carry the electricity to homes and buildings that require low-voltage electricity.

All sources of electricity must have a positive terminal and a negative terminal, and electrons will always flow from the negative to the positive through a conductor (copper wire, for example).

Lightning

Lightning generates plenty of electricity. It starts as electrical charges developing inside a cloud. The positively and negatively charged atoms go to different parts of the cloud—the positive at the top, negative at the bottom. When the negatively charged atoms get too crowded, they "jump" to a different cloud or even to the ground: that "jump" causes a spark of static electricity called lightning.
Even though lightning produces electricity; it's not practical to use that electricity for our power needs. There are too many obstacles—we don't know when or where lightning will strike, how powerful each bolt will be or how to direct the surge of electricity into our electrical systems. What's more, the average lightning bolt produces about 250 kilowatt hours of electricity, but the average home uses 936 kilowatt hours of electricity every month. That means that one lightning bolt's energy could only power one home for about nine days!

Static Electricity

Have you ever reached for a metal doorknob and gotten a shock? That was static electricity at work! But how does that happen?

All matter is made up of atoms that contain protons, neutrons and electrons. Protons have a positive charge, electrons have a negative charge, and neutrons have no charge. Atoms normally have the same number of protons and electrons, and in this state, the atom is "neutral." But by rubbing things together, you can make electrons move from one atom to another, causing atoms to have a positive or negative charge. That's static electricity!

So when you walk across a carpet, electrons move from the carpet to you, giving you extra electrons. Then when you touch a doorknob, the electrons move from you to the knob—and you get a static electric shock.

Uses for Electricity

If you've ever lost power in a thunderstorm, you've probably noticed how many items in your home use electricity. But the uses for electricity go way beyond your TV—electricity is used in all kinds of useful ways, including:

- Airplane and car navigation systems
- Streetcars and subways
- Pacemakers that help regulate people's heartbeats
- Refrigerators, dishwashers and most other home appliances

Demand for Electricity

Although the current recession is expected to dampen electricity demand in the near term, electricity demand is expected to increase by 77% by 2030 (source: Energy Information Administration / International Energy Outlook 2009). This growth projection is based on population growth and increased supply to currently non-developed countries.