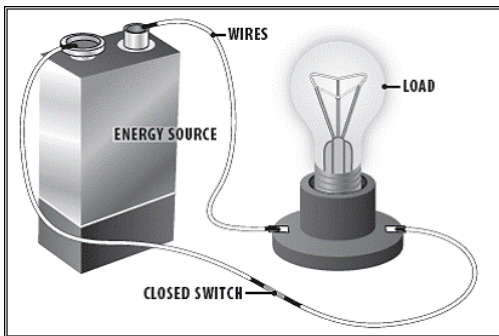


# Electricity

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## Introduction to Electricity



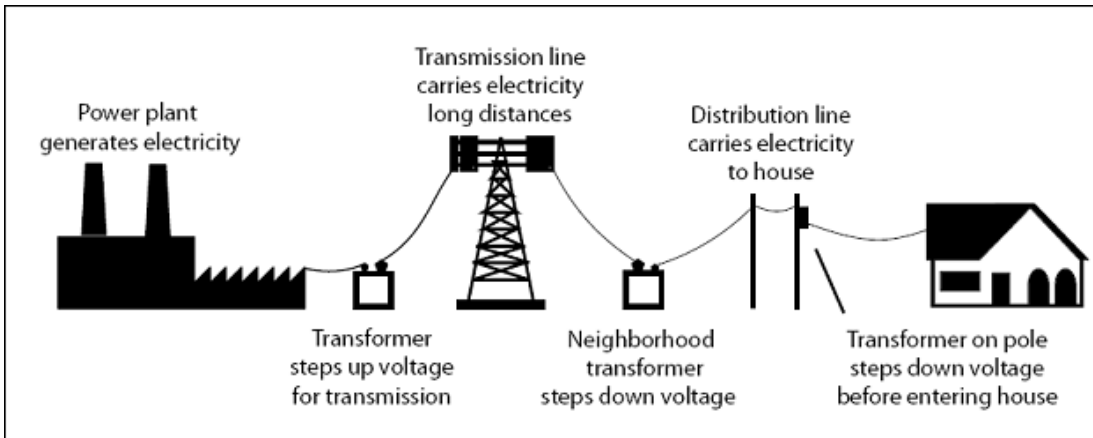
**Complete path allowing electricity to flow from the energy source to the load**

## What is Electricity?

Electricity is a mysterious force. We can't see it like we see a lamp, but we know when it is working. Electric current is simply a flow of charge. Phenomena such as electric currents, electric charges, electric fields, electric potentials, electromagnetism, etc. are all part of electricity. A metallic conductor contains free charges that move when an electric field exerts force on them. These free charges are negative electrons. An electric charge flows from higher potential to lower potential.

## Electricity Travels Through Wires

Electricity moves through wires very fast. Electrons flow through the power lines to our houses. They flow through the wires in our houses and back to the power plant. Then they start their journey again. In just one second, electricity can travel around the world seven times. Power plants make electricity. The electricity flows through transmission lines that are held up by power towers. The transmission lines carry large amounts of electricity to electric poles in cities and towns. Distribution lines carry small amounts of electricity from the electric poles to houses and businesses.



There are two types of electricity: 1) static electricity and 2) current electricity or dynamic electricity.

## What is Static Electricity

**Static Electricity** is an electrical charge that cannot move. It is created when two objects or materials that have been in contact with each other are separated. When in contact, the surface electrical charges of the objects try to balance each other. This happens by the free flow of electrons (negatively charged particles) from one object to the other. When the objects separate, they are left with either an excess or a shortage of electrons. This causes both objects to become electrically charged. If these charges don't have a path to the ground, they are unable to move and become "static". If static electricity is not rapidly eliminated, the charge will build up. It will eventually develop enough energy to jump as a spark to some object nearby that is grounded or less highly charged.

Static electricity is commonly produced when:

Liquid flows through a pipe or hose, or through an opening in a pipe or hose

Spraying or coating

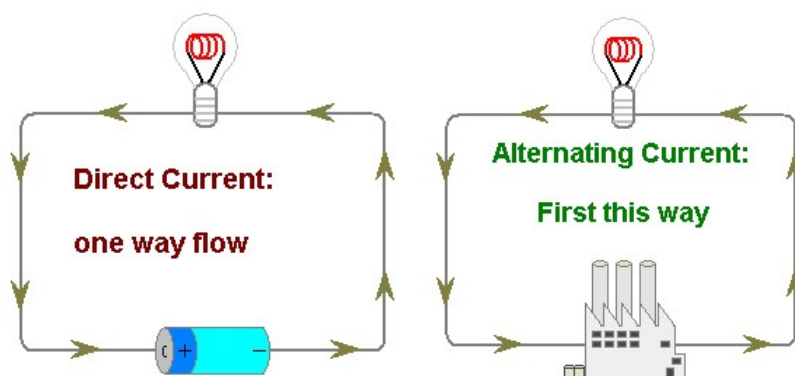
Blending or mixing

Filling tanks, drums, cans or pails

Moving appliances and along non-conductive conveyor belts or drive belts.

**Current electricity:** With electric currents, we are talking about electrons in motion. The electric current through any cross sectional area of a conductor is defined as the net charge transferred through it per second. The direction of an electric current is taken along the direction of motion of a positive charge. When the current is caused by electrons, then the direction of the current runs contrary to the direction of electrons. The current electricity is further characterized as (DC) [Direct current](#) and (AC) [Alternating current](#). When electrons flow in one direction, it is a direct current whereas when electrons flow first in one direction and then back in the opposite direction in a periodic cycle they flow in an alternating current.

The electric current is given as  $I = Q/t$



All conductors or insulators are made up of atoms joined together. The atom has a center, called a nucleus, and the nucleus contains positively charged particles called **protons** and uncharged particles called **neutrons**. The nucleus of an atom is surrounded by negatively charged particles called **electrons**. The negative charge of an electron is equal to the positive charge of a proton, and the number of electrons in an atom is usually equal to the number of protons. When the balancing force between protons and electrons is upset by an external force, an atom may gain or lose an electron. When electrons are "lost" from an atom, they are referred to as free electrons. These free electrons move from one atom to the next and produce a flow.

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## Reference links:

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<http://www.ndt-ed.org/EducationResources/.../directcurrent.htm>

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