Electricity is produced at an electric power plant. Some fuel source, such as coal, oil, natural gas, or nuclear energy produces heat, which is used to boil water to create steam. The steam under high pressure is then used to spin a turbine that interacts with a system of magnets to produce electricity. The electricity is transmitted as moving electrons through a series of wires to homes and business.

**Introduction**

This is a typical electric power plant located in Shawville, Pennsylvania.

![Image](image.png)

Notice the large pile of coal on the left side of the plant and the three smokestacks, each one taller than the previous. The tallest stack was built to cut down on the local air pollution, where the sulfur oxides are emitted higher into the atmosphere. This has not proven to be a solution to the problem. As a result, the sulfur oxides now travel great distances before coming down in the form of acid rain.

**Electric Power Plants**

Electric Power Plants have a number of components in common and are an interesting study in the various forms and changes of energy necessary to produce electricity.
• **Boiler Unit**: Almost all of power plants operate by heating water in a boiler unit into super heated steam at very high pressures. The source of heat from combustion reactions may vary in fossil fuel plants from the source of fuels such as coal, oil, or natural gas. Biomass or waste plant parts may also be used as a source of fuel. In some areas solid waste incinerators are also used as a source of heat. All of these sources of fuels result in varying amounts of air pollution, as well as, the carbon dioxide (a gas implicated in global warming problems).

• **Turbine-Generator**: The super heated steam is used to spin the blades of a turbine, which in turn is used in the generator to turn a coil of wires within a circular arrangements of magnets. The rotating coil of wire in the magnets results in the generation of electricity.

• **Cooling Water**: After the steam travels through the turbine, it must be cooled and condensed back into liquid water to start the cycle over again. Cooling water can be obtained from a nearby river or lake. The water is returned to the body of water 10-20 °C higher in temperature than the intake water. Alternate method is to use a very tall cooling tower, where the evaporation of water falling through the tower provides the cooling effect.

• In a **nuclear power plant**, the fission chain reaction of splitting nuclei provides the source of heat.

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**Creating Electricity using a Generator**

If a magnetic field can create a current then we have a means of generating electricity. Experiments showed that a magnetic just sitting next to a wire produced no current flow through that wire. However, if the magnet is moving, a current is induced in the wire. The faster the magnet moves, the greater the induced current. This is the principal behind simple electric generators in which a wire loop is rotated between to stationary magnetics. This produces a continuously varying voltage which in turn produces an alternating current.

![Diagram of a simple electric generator](http://nksu.com/fn/en/electricity/generator.jpg)

Diagram of a simple electric generator is shown above. To generate electricity then, some (mechanical) mechanism is used to turn a crank that rotates a loop of wire between stationary magnets. The faster the crank turns, the more current that is generated. In hydroelectric, the falling water turns the turbine. The wind can also turn the turbine. In fossil fuel plants and nuclear plants, water is heated to steam which turns the turbine.
Outside Links

• http://zebu.uoregon.edu/1999/ph161/l3.html

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