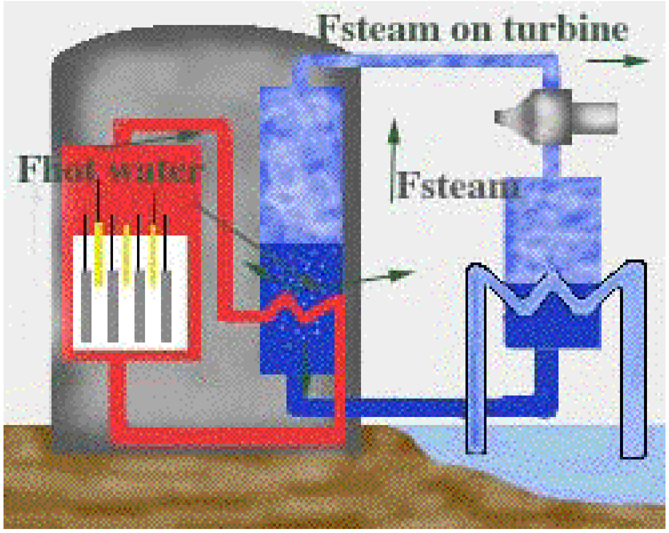
Nuclear Power Physics

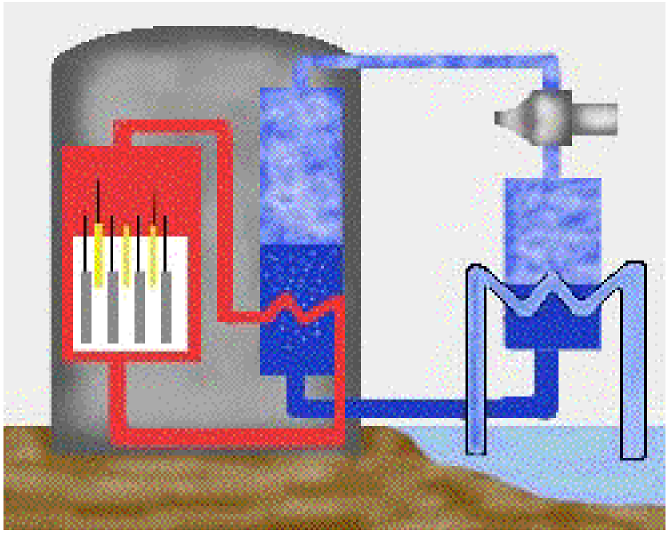
The complete layout of a nuclear power station can be seen in the following diagram. Two different aspects of physics are vitally important in understanding how a nuclear power station operates. The first diagram also shows where in the nuclear power station these actions operate. The two parts of physics discussed on this and another page is heat, and the forces in action.



The first step in the nuclear power production process is the chemical decomposition reaction that occurs. This process is discussed in depth at the nuclear chemistry page. After the chemical decomposition reaction, the energy released in form of heat must be harvested into some form of useable energy. The final form of energy that is made is electrical energy. While the previous diagram looked somewhat complex throughout the path of the heat after the chemical reaction, it is actually very simple and is very similar to the operation of two other power sources described at this site: Wind Power and Hydroelectric Power.

Another name for heat is thermal energy. Some other words are used for discussing heat in addition to thermal energy. Be sure to check out the help page related to the defintions associated with heat. To harness the heat of the chemical reaction means that the thermal energy needs to be converted in some way into electrical energy. The next step in the nuclear power plant process is the conversion of thermal energy to mechanical energy, the energy that is used to do work. The heat that is taken from the chemical reaction drives a device similar to the steam engines that were used to drive trains in the nineteenth century. More of nuclear power's relation to the invention of the steam engine, and consequently the steam turbine is found at the nuclear history page.

Water flowing through some heat absorbing tubes flows through a chamber that receives the energy from the chemical decomposition reaction. The water heats up quickly, and turns into extremely hot steam. This steam due to its high temperature, is moving quickly, and has a great amount of kinetic energy. The steam's kinetic energy is the driving force that will act as mechanical energy and move the nuclear energy process along, past the stage of thermal energy. The help file that relates temperature, volume, and pressure of a gas is given as reference, with the equations that represent these processes. The next illustration shows the nuclear power plant and these actions that occur within it.



All forms of energy can be discussed in terms of kinetic and potential energy. For example, the heat that is given out from the chemical reaction is kinetic energy because of its velocity. For a further introduction and examination of kinetic and potential energy, look at the help page for kinetic and potential energy. It is important to note that the energy produced by a turbine is not directly related to the velocity of the steam, but by the force exerted on the turbine. The hydro power physics page examines some of the equations associated with velocity.

But the steam will ultimately be used to perform mechanical energy on the turbine, directly or indirectly. It is important to note that energy is never created nor destroyed, but it is converted. For the nuclear power process, first the chemical energy is trapped as part of the uranium atom is converted to thermal energy. Thermal energy is converted to potential energy and then kinetic energy as the water evaporates. The steam in the form of kinetic energy is used to perform mechanical energy that is converted to electrical energy. Take a quiz on the science concepts of this page.