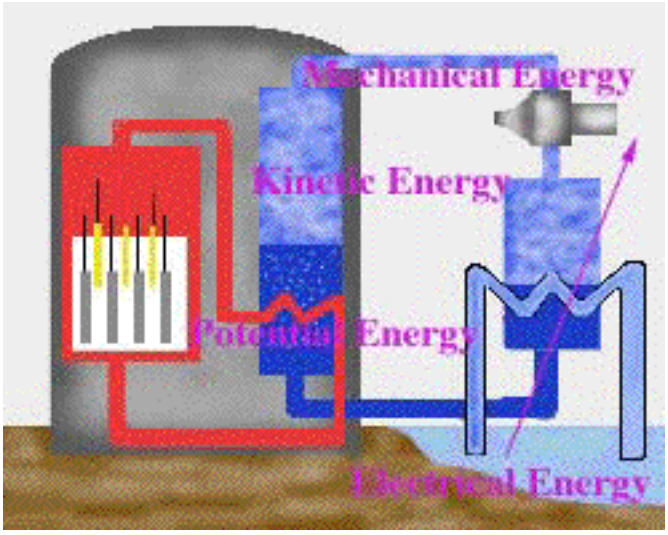
Energy & Its Many Forms

Energy exists in many different forms. These are some of the forms that energy can be. It is very easy for energy to pass from being in one of these forms to being in another. All of these kinds of energy are important to the alternative energy process. By using the model for the nuclear power plant, the five different forms of energy discussed below may be visualized.



Thermal Energy is essentially the same as heat. The fire in the above diagram is transferring energy in the form of heat to the water right above it.

Potential Energy is easily illustrated as a rock on a cliff. The rock has a great potential to fall off the cliff. Usually potential energy is present right before some or all of it is converted into kinetic energy. The water is heated by the nuclear reaction, and before the water reaches the boiling point (the point where it is turned into a gas), it has steadily building potential energy. In a hydro power system, the water that is first entering the gates has a great potential energy because of its height. The equation for potential energy is seen below:

PE = m * g * h, where m is the mass in kg, g is 9.8 m / s^2 (or -9.8 m / s^2 if the direction is downward), and h is the object's height.

Kinetic Energy is the energy of motion. When something is moving, it is said to have kinetic energy. The steam in the above diagram has a great amount of kinetic energy. Every gas has some kinetic energy, and hot gases have more while cool gases have less. For more information about gases, click on the link. In a hydro power system, after the water pases through the gates and moves to the turbines, it loses elevation, but increases its velocity. This process will decrease its potential energy and increase its kinetic energy. The kinetic energy equation is given below:

KE = 0.5 * m * v^2, where m is the mass in kg, and v is the velocity.

Mechanical Energy is the combination of kinetic energy and potential energy. The turbine is turned because of the work that the steam does. The mechanical energy of the steam turns the turbine. Then the mechanical energy of the steam is transferred to the turbine that does work on the generator.

Electrical Energy makes the last intermediate step between the thermal energy of this system, and the electricity that is supplied to homes. The generator rotates and causes the mechanical energy to be converted to electrical energy. See also the magnetism page that expains generators.

The total energy of the system does not change because of the Law of Conservation of Energy. If nuclear power plants had a 100% efficieny rating of converting thermal energy to electric energy, the above diagram could be

considered a closed system. In a closed, isolated system, energy is neither created nor destroyed, it only changes form as illustrated and described above.