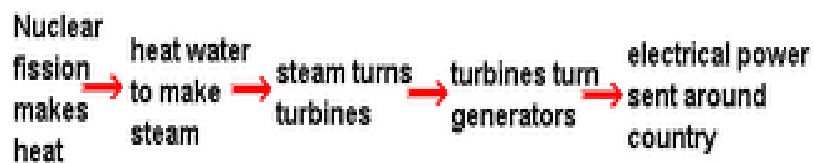


Nuclear power plants

A generating station in which nuclear energy is converted into electrical energy is known as a nuclear power station. In a nuclear power station, heavy elements such as Uranium (U^{235}) or Thorium (Th^{232}) are subjected to nuclear fission in a special apparatus known as a reactor. The heat energy thus released is utilized in raising steam at high temperature and pressure. The steam runs the steam turbine which converts steam energy into mechanical energy. The turbine drives the alternator which converts mechanical energy into electrical energy. The most important feature of a nuclear power station is that a huge amount of electrical energy can be produced from a relatively small amount of nuclear fuel as compared to other conventional types of power stations.

Working:



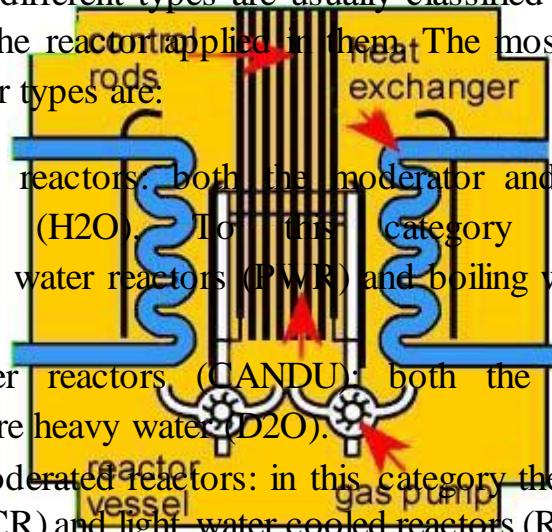
- Nuclear power stations work in pretty much the same way as fossil fuel-burning stations, except that a “chain reaction” inside a nuclear reactor makes the heat instead.
- The reactor uses Uranium rods as fuel, and the heat is generated by nuclear fission. Neutrons smash into the nucleus of the uranium atoms, which split roughly in half and release energy in the form of heat.
- Carbon dioxide gas is pumped through the reactor to take the heat away, and the hot gas then heats water to make steam
- The steam drives turbines which drive generators. Modern nuclear power stations use the same type of turbines and generators as conventional power stations.

Types:

Several nuclear power plant (NPP) types are used for energy generation

in the world. The different types are usually classified based on the main features of the reactor applied in them. The most widespread power plant reactor types are:

- Light water reactors: both the moderator and coolant are light water (H_2O). To this category belong the pressurized water reactors (PWR) and boiling water reactors (BWR).
- Heavy water reactors (CANDU): both the coolant and moderator are heavy water (D_2O).
- Graphite moderated reactors: in this category there are gas cooled reactors (GCR) and light water cooled reactors (RBMK).
- Exotic reactors (fast breeder reactors and other experimental installations).
- New generation reactors: reactors of the future.



Reactor Types

- The AGR (Advanced Gas cooled Reactor) is a development from MAGNOX: the cladding is not Magnox and the fuel is slightly enriched. The moderator is also graphite and the coolant is CO_2 . Contribution to total world capacity is 2.5%. This type is not manufactured any longer.
- The newest gas cooled reactor type is the HTGR (High Temperature Gas cooled Reactor), which is cooled by helium and moderated by graphite. In this reactor as high as $950^{\circ}C$ coolant temperature can be achieved. The efficiency of a newly developed type, the Gas Turbine Modular Helium Reactor (GT-MHR) might be as high as almost 50%.