

NUCLEAR JUNIOR

An atom is the smallest part of all elements present in nature. Atoms consist of a nucleus of particles (protons and neutrons) surrounded by a cloud of electrons. Every time the nuclei of the atoms divide to form two or more smaller nuclei (fission) a large amount of energy is released. Nuclear energy can also be produced by fusion, i.e. by joining the nuclei of light elements. Of the two reactions, fission is the only one that can be realized and that can be controlled by man. In the nuclear power plants, the heat that is generated during fission can be used to move electrical generators.

The combustible used in the nuclear power plants consists of radioactive substances such as uranium and plutonium. The first studies on the phenomenon of radioactivity date back to the end of 1800. In 1934 the Curies discovered the first case of artificial radioactivity. In 1942, the Italian physicist, Enrico Fermi carried out the first experiment of fission in controlled conditions. The first electronuclear power plant was built in the Soviet Union in 1954, while the first nuclear power plant for the production of electric energy for civil purposes dates back to 1956 and was built in England. Today nuclear energy is exploited by numerous countries. Its development was slowed down by a series of accidents (the most important one was in Chernobyl in 1986), from the problem of the elimination of radioactive waste to the difficulty in the management and maintenance of the older power plants. In a nuclear power plant steam is produced without using fossil combustibles.

The nuclear reactor is like a normal boiler and the steam generated in this way can be utilized to operate a turbine connected to an electrical generator. In particular, the “heart” of the reactor of a nuclear power plant with nuclear fission, is called the “core” and usually it is cylinder-shaped. There are two types of reactors: light water reactors that use enriched uranium and heavy water reactors that use natural uranium.