

Nuclear power

[Science](#), [Physics](#)



Nuclear Power Introduction Nuclear power refers to the energy generated from a nuclear reactor by utilizing nuclear reactive materials. Nuclear power has been generated into motive force and electricity. In 1956, the first nuclear plant was started in England and it provided electricity in the country for forty seven years. The most commonly used material is Uranium which is radioactive and is mined in large scale in Canada, Australia, and Kazakhstan (WNA). Uranium has many isotopes and the commonly used isotope is Uranium-235. This is due to the fact that Uranium 235 is easily split compared to the other isotopes of Uranium. Energy from Uranium is generated by the use of nuclear reactors. The rods of Uranium are packed in a tank containing pressurized water and neutrons at high speed are bombarded with the atoms of Uranium resulting in the splitting of the atoms (Sample 1). The whole reaction generates a lot of energy, some of which can be converted into heat and can result in the plant degradation. Thus, a control mechanism is applied where control rods that absorb generated neutrons are used in the reactor tank. Radioactive materials are dangerous and care should be taken when handling them. Therefore, ultimate care is taken to avoid contact with radioactive material and also to prevent radiation waves from escaping from the plant. How Uranium ore is made into nuclear energy Uranium occurs naturally on earth and is obtained by mining. After mining, the Uranium is then enriched with isotope 235 and is then processed into pellets which are loaded into the nuclear reactor (WNA). During the enrichment stage, Uranium is converted into a gaseous form and the Uranium Oxide is converted into Uranium hexafluoride. The enriched Uranium hexafluoride is converted into Uranium dioxide which is in powder

form and the powder is compressed into pellets. The pellets are then loaded into a clear reactor tank containing pressurized water. The reactor is started and neutrons from an external source are channeled into the reactor at a very high speed. The neutrons bombard the atoms of the Uranium making them to split. Energy is liberated when the Uranium atom is split into electrons, neutrons, and protons. The energy can then be converted into fuels. The process through which a Nuclear Reactor makes electricity The reactor core is filled with pressurized water. When the reactor is switched on, neutrons channeled at a high speed collide with atoms of Uranium which is packed inside the reactor core. This produces energy which results in boiling of the water. The steam formed from the boiling water is channeled through the reactor itself or from separate vessels. The steam is then used to drive the turbine which then produces electricity. After turning the turbines, the steam condenses into water which is then recycled into the reactor by pumping action. The condensed water is then heated again by the energy generated during the splitting of uranium 235 which heats the water to boiling producing the steam. The process is recycled all over again and very time steam is produced, the turbines are turned and they generate electricity. During the process, more neutrons are generated from the nuclear fission reaction. Thus, a steady amount of neutrons to keep splitting the uranium is produced. A reactor core containing 75 tonnes of enriched Uranium can generate up to 1000 megawatts (WNA). Fourteen percent of the worlds' electricity is generated by nuclear plants. Other uses of Nuclear Technology In addition to the production of electricity, nuclear technology is used in many their fields. These include nuclear medicine, to provide heat for

desalination, and space missions. In nuclear medicine, radiation is used in making a quick and accurate diagnosis. Radiation is used in form of X-rays and CT scans. Radiotherapy is used in the treatment of cancer. Radiation is used to weaken and eventually kill cancerous cells which rid the person of cancer. However, there are no protective mechanisms to prevent healthy cells from being destroyed by the radiation. Thus, radiation therapy is only carried out under special conditions. In another scenario, the energy generated in the nuclear reactor can be converted into heat instead of electricity. It can then be used to heat homes and can also be used to heat reactants in industries. Nuclear energy is also used to generate thermal energy in space missions. Research is being carried out to investigate whether nuclear energy could be used to make hydrogen. The Nuclear Industry The nuclear industry is being exploited globally. The nuclear industry has a lot of potential in solving global energy uses. The government and other interested parties are setting up nuclear plants to generate electricity. The industry has created many job opportunities for service companies. Regulation of nuclear material is necessary to avoid countries making weapons from Uranium. Conclusion Currently, nuclear energy is being used globally to provide fuel and energy. Nuclear plants produce 14% of the worlds' electricity. In addition, nuclear energy and technology is being applied in medical fields to cure some challenging diseases such as cancer. Future research is being focused on using nuclear energy to generate hydrogen which can then be converted into clean energy. Works Cited Sample, Ian. "Beginner's Guide: How Nuclear Power Works." The Guardian, 2008. <http://www.theguardian.com/science/2008/apr/30/particlephysics>.

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