

What is Nuclear power?

Energy may be generated burning natural resources, or fossil fuels such as coal, gas, or oil. The energy of moving water or wind may be used and has the advantage of being renewable. The energy in sunlight may also be captured with the emerging solar energy technologies. Finally, we may capture energy released by radioactive elements when they spontaneously decay releasing atomic particles or energy. Whatever the original source, a portion of the energy is used to produce electricity or for transportation purposes or for heating water or air. Electrical generation plants use the heat or motion of those primary sources to generate electricity.

Most power plants produce electricity by first boiling water to produce steam. The steam is used to spin a turbine. Turbines are fan-shaped structures which spin a shaft connected to a coil of wire that spins between two magnets. The spinning coil of wire generates electricity. The main difference between a nuclear power plant and other kinds of power plants lies in the way the water is heated to steam. In a nuclear power plant, heat is produced by splitting atoms, rather than the combustion of oil, gas, or coal.

Exposure to radiation from nuclear fuel is a risk to living things. Intense radiation will kill a person within a few days or weeks and lower level exposure is associated with a long-term increased incidence of cancer and other serious illnesses.

Advantages

Nuclear generated electricity is unique in that it inherently addresses many of the short-comings of the other means for power generation. For example, there is a limit to the supply of fossil fuels. The most optimistic estimates have fossil fuel lasting no more than 100 years; however, they may become economically undesirable in much less time (that is, they become more expensive as the amount left gets smaller). Nuclear fuels can provide enough power to largely replace fossil fuel use for electricity generation. The power generation potential from even a small amount of uranium is so great that, for practical purposes, nuclear fuel can be thought of as inexhaustible and the same as a renewable energy source.

In contrast to fossil fuel plants (coal, oil and gas), nuclear power plants do not contribute greenhouse gases or release compounds the result in acid rain. According to the Nuclear Energy Institute, U.S. nuclear power plants prevent 5.1 million tons of sulfur dioxide, 2.4 million tons of nitrogen oxide, and 164 million metric tons of carbon from entering the earth's atmosphere each year if the amount of energy produced by those plants were produced instead by fossil fuels. A coal-fired power plant actually releases more radioactivity into the atmosphere than a properly functioning nuclear power plant. Finally, nuclear power plants are one of the most economical forms of energy production since nuclear fuel costs (for the same amount of electricity) represent only a fraction of the cost of fossil fuels.

Disadvantages

There are several disadvantages, and those problems result from not only the operation of nuclear power plants but also from obtaining the radioactive material and

from potential catastrophic disasters. Like fossil fuels, the nuclear fuel raw materials come from the Earth. Uranium, the primary fuel material, is mined and mining and purifying uranium has not, historically, been a very clean process. Transporting nuclear fuel to and from plants poses some risk, although to date, the safety record in the United States has been good.

The most pressing environmental concern facing the nuclear industry is the issue of waste disposal that results from operation of the nuclear power plant. Nuclear waste is highly radioactive and will remain so for hundreds, even thousands of years. There is no safe, permanent storage facility for spent fuel. Nuclear power reactors do contribute a measurable increase in radiation to the environment around a nuclear power plant.

There is a significant risk of catastrophic release of radioisotope into the environment from explosions at these power plants. The United States nearly had a nuclear disaster twenty years ago at Three Mile Island. The worst incident so far was the explosions that occurred at a nuclear power plant at Chernobyl in the Ukraine. Chernobyl was poorly designed and improperly operated, but it dramatically shows the worst-case scenario. Chernobyl scattered tons of radioactive dust into the atmosphere, many people died, some are still living with the health consequences of that "incident."