

Activity #2: Is Nuclear Power Better? (Nuclear v. Coal)

Unlike power plants that rely on the burning coal for energy, nuclear reactors depend on controlled reactions involving the radioactive element, Uranium. Coal is produced from the decay and fossilization of living organisms over millions of years. Uranium is a natural element found within the Earth. Ores containing Uranium are mined and the majority of that Uranium is an isotope called U-238, which is relatively nonreactive. Scientists have developed methods of enriching the U-238 in order to transform it into a much more reactive isotope, U-235. This isotope is used to create fuel rods that run the reactor and generate energy.

Link: Fission Reactor. <http://www.brightstorm.com/science/physics/nuclear-physics/fission-reactor>

***Assume the average person uses 100 kwh of electricity per day (10 hr. day). (SSN 120, SSBN 160)**

>Conversion Factor: 1 kwh = 3.6 MegaJoules (MJ) or 3,600,000 Joules or (3.6 x 10⁶) J

a) How much energy is used per person per day?

b) How much energy would be used by a small town containing 160 people per day?

>Conversion Factor: 1kg U-235 can generate 80 TeraJoules (80,000,000,000,000 J) or (8.0 x 10¹³)

c) How much U-235 is needed in order to produce the amount of energy this city needs in one day?

>Conversion Factor: 80 TeraJoules of Energy can be generated from 3000 metric tons of coal.

>Conversion Factor: 1 metric ton of coal has a mass of 1000 kg.

d) How much coal would be needed to run this same town for one day?

e) Which energy source uses the least amount of raw materials for the fuel? What implication does this have for future energy needs?