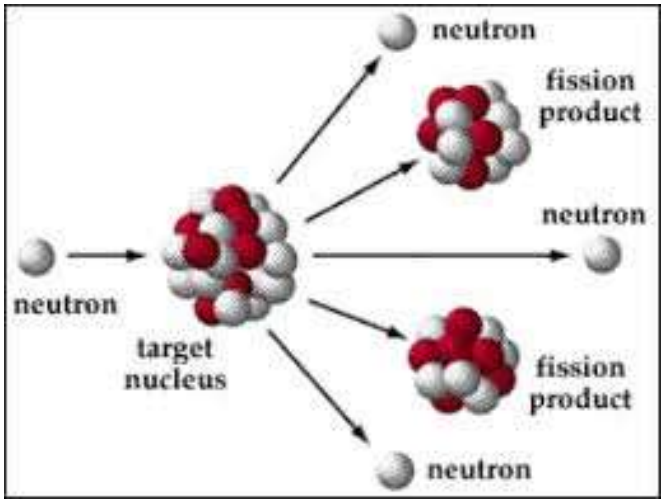
Energy and nuclear radiation

There are two ways in which nuclear radiation can be used to generate energy.

1. **Fission**



If a neutron is fired at a uranium 235 nucleus, it becomes unstable and separates into two smaller nuclei and releases some more neutrons. The mass of these nuclei and neutrons is slightly less than the mass of the original nucleus and neutron. Using the equation $\mathbf{E= mc^2}$, where ***m*** is the mass lost and ***c*** is the speed of light, we can calculate the energy released in each fission reaction. If the neutrons that are released are captured by other uranium 235 nuclei, the process can be repeated. This is known as a **chain reaction**.

In nuclear power stations, the energy released is used to heat water to produce steam to turn a turbine. This drives a generator which produces electricity.

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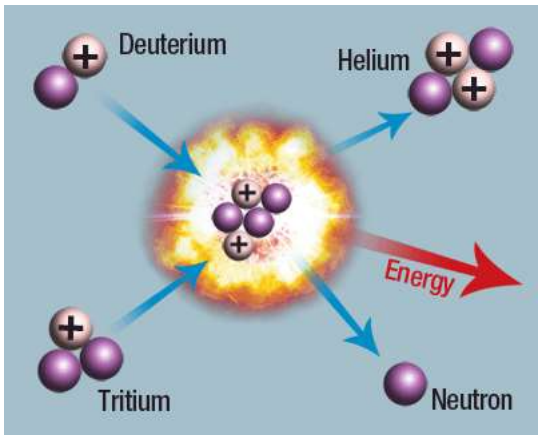
Energy and nuclear radiation (continued)

2. Fusion



Fusion is a process where two smaller nuclei are combined to create a larger nucleus. Again, the total mass of the products of this reaction is less than the total mass before the reaction, allowing us to calculate the energy released by using the equation $E = mc^2$. It is thought that fusion would allow us to generate far more energy than fission at much lower risk, however we are currently unable to do this economically. Fusion is the process in which stars convert fuel to light and heat.

Note: It is important that you do not misspell fusion or fission!

Using nuclear radiation to produce electricity reduces the amount of carbon dioxide released into the atmosphere. Carbon dioxide is a greenhouse gas which helps contribute to global warming. However, nuclear reactors produce radioactive waste which needs to be stored for thousands of years before it is safe.