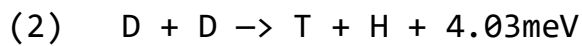


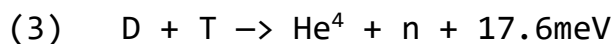
Deuterium Fusion  
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The most practical source of inexhaustible energy is D-D-T fusion. D-D-T fusion requires the abundant, non-radioactive isotope of hydrogen, deuterium, which has one proton and one neutron in its nucleus. Deuterium occurs in the seas at a rate of 1 part in 6500 of hydrogen. It can be transported to the fusion power plant as heavy water (D<sub>2</sub>O). It is estimated that at current power consumption levels, there's enough deuterium on Earth to supply 50 million years of electric power.

Fusion power plants consist of a reactor and an AC generator. The reactor is a magnetic confinement torus known as a tokamak. The tokamak confines deuterium plasma at 400 million degrees kelvin in order to fuse deuterium as per the following reactions:



The first reaction releases the non-radioactive isotope of helium, He<sup>3</sup>, whereas the second reaction releases standard hydrogen. The tritium reaction product in equation (2) is reabsorbed by the plasma, and reacts with the deuterium as follows:



It is possible to regulate the reactions so that Eq.(2) occurs more often than Eq.(1). This is called autoflux fusion. The result is that Eq.(3) occurs more often, resulting in a significant power upgrade.

The tokamak requires extensive computer controls in order to confine a deuterium plasma. High-speed supercomputers are used here. One of the reasons why D-D-T fusion wasn't available in the past was because these computers weren't available. These computers are petaflop computers, meaning 10<sup>15</sup> calculations per second (quantum computers). In order to reach the Lawson criterion for D-D-T fusion, such computers are needed to model the deuterium plasma.