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Fusion Energy

Source: International Energy Agency (IEA)

Fusion is widely researched because it could be a clean, safe and virtually unlimited source of energy. Currently the world mostly depends on fossil fuels for its energy. Fossil fuels are set to be in short supply in the future and with the world's energy needs increasing rapidly (see picture), an alternative method of producing energy on a large scale is needed.

Most design studies for fusion power plants involve using the fusion reactions to create heat, which is then used to operate a steam turbine, which drives generators to produce electricity. Except for the use of fusion as the heat source, this is similar to most coal, oil, and gas-fired power stations as well as fission-driven nuclear power stations. The production of net electrical power from fusion is planned for DEMO, the next generation reactor after ITER.

Although the point of breakeven - where more energy comes out of the reaction than is put into the reaction - has been reached, there is still more work to do. Scientists have to overcome engineering challenges they face in construction of the reactor and in operating it with a high reliability and availability. And last, but not least - they have to find ways to reduce the costs of construction and operation so that the energy does not become too expensive.

To reach the goal of a clean, safe source of energy and overcome the challenges, we need bright engineers that dive into the field and help solve the problems at hand. Years of research have already shown huge progress in taming fusion. We can now capture plasmas in magnetic bottles that we call tokamaks. We managed to reach temperatures hotter than the sun. We have obtained substantial control over the confinement, and increased the output power.

Whereas ITER is the most advanced reactor to date, researchers are also looking at other concepts for fusion devices. Most designs are based on magnetic confinement, such as tokamaks, fusors and stellarators. Inertial confinement is a different concept that is actively pursued. With inertial confinement, high-energy laser beams slam hydrogen ions together in a small target hard enough to let them fuse.

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Upcoming Events

- 05/16/2011 [Fusion Frontiers and Interfaces workshop](#)
- 06/20/2011 [5th ITER International Summer School](#)
- 07/11/2011 [48th Culham Plasma Physics Summer School](#)
- 08/22/2011 [9th Summer School SUMTRAC 2011 - Experimental Work on Tokamaks](#)
- 09/05/2011 [Carolus Magnus Summer School on Plasma and Fusion Energy Physics](#)
- 09/20/2011 [Summer School on Plasma diagnostics by electrical probes and lasers](#)
- 09/20/2011 [Workshop on Electrical Probes in Magnetized Plasmas](#)
- 10/13/2011 [PhD Event on Fusion Science and Technology](#)

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