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Fusion reactor decision must wait

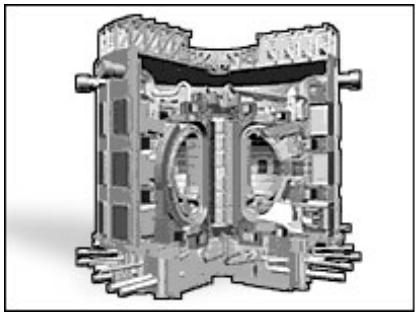
The six nations planning to build the world's biggest nuclear fusion reactor ended their latest meeting with no agreement on a site for the facility.

Officials had gathered in Vienna at the International Atomic Energy Agency to discuss the project, which will be based in either France or Japan.

The parties are deadlocked over the decision - and neither Japan nor the EU will back down in favour of the other.

Europe has warned it could go it alone if the matter is not resolved soon.

ITER - NUCLEAR FUSION PROJECT



The project is estimated to cost $10bn and will run for 20 years
It will produce the first sustained fusion reactions
Iter is the final stage before a commercial reactor is built

Outside support

The decision to break away could come later this month when Europe's Council of Ministers is expected to discuss the issue. The EU would look to other nations outside the Iter consortium to come in and help fund the work at Cadarache in the south of France.

These might include India, Switzerland and Canada, which itself recently withdrew from the Iter process.

Japan has been irked by comments in the media over the past day that it was about to concede. This will not happen, its delegation in Vienna has said.

It is adamant that its candidate site at Rokkasho-mura in the north of the country is the best - and it has the support of the US and South Korea.

The other two Iter parties, Russia and China, back Cadarache on the French Mediterranean.

"There was no agreement but there was no breakdown either. On the contrary, we have done good work and made good progress," European Commission spokesman Fabio Fabbi told the Reuters news agency.

"The two countries least enthusiastic about the European option - Japan and the United States - weren't very warm but they were no longer firmly against it," he said.

Challenging concept

After the International Space Station, the reactor would be the largest international research and development collaboration.

In terms of the physics and huge amounts of energy involved, the project would be akin to building a star on Earth.

In a fusion reaction, energy is produced when light atoms - the hydrogen isotopes deuterium and tritium - are fused together to form heavier atoms.

This is quite different to nuclear fission in which atomic nuclei are split to release energy.

But to use controlled fusion reactions on Earth, it is necessary to heat a gas to temperatures exceeding 100 million Celsius - many times hotter than the centre

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of the Sun.

The engineering challenges this presents are immense. Scientists envisage running the reactions suspended in magnetic fields in a torus-shaped chamber called a tokomak.

The rewards, if this can be made to work on the large scale, are extremely attractive.

One kilogram of fusion fuel would produce the same amount of energy as 10,000,000 kg of fossil fuel. What is more, fusion does not produce the long-term high-level radioactive waste that burdens nuclear fission.

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