BBC NEWS

Decision day for fusion project

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ITER - NUCLEAR FUSION PROJECT

The project is estimated to cost $5bn over the next 10 years
It will produce the first sustained fusion reactions
Iter is the final stage before a commercial reactor is built

Scientists involved in the next step to harness nuclear fusion - the power of the Sun - are meeting to decide where to put the $5bn fusion reactor.

It will take a decade to build the fusion machine which releases energy in a similar way to the Sun's furnaces.

Scientists say the new reactor will be the first such prototype to give out a lot more power than it consumes.

Two venues are in contention, Cadarache in southern France and front-runner Rokkasho-mura in Japan.

Competition between the two sites has been intense. The winner is expected to be announced on Friday or Saturday at a meeting in Washington, DC.

Power from seawater

The International Thermonuclear Experimental Reactor (Iter) is the boldest nuclear initiative since the Manhattan Project - the effort to build the first atom bomb.

In a conventional nuclear power station the splitting atoms inside radioactive material take place in a controlled chain reaction whose by-product is heat, which is used to generate electricity.

Nuclear fusion takes a different approach, seeking to emulate the Sun.

Two atoms of deuterium - a heavy form of hydrogen - are forced together under extremely high temperatures - tens of millions of degrees.

When they fuse they release fast neutrons which can be used to heat a thermal blanket which in turn is used to generate electricity.

Advocates of fusion power point out there is an almost limitless supply of deuterium available as it can be derived from seawater.

Japan favourite

France and Japan are the finalists for the venue for Iter, but member nations are split.

The European Union is backing France but Japan, Canada, China, Russia, South Korea and the United States are reported to be favouring Japan.

"We have the structure, scientific and technical environment to ensure that this scheme can start up with competence, expertise and solid safety guarantees," French Research Minister Claudie Haignere said.

"If our site is chosen, Japan will cover the costs that are needed," said Hidekazu Tanaka, a senior official of the Japanese Education, Culture, Sports, Science and Technology ministry.

Iter would be the world's largest international cooperative research and development project after the International Space Station.

Self-sustaining

Scientists say that Iter will be the first fusion device to produce thermal energy at the level of an electricity-producing power station.

Its goal will be to produce 500 megawatts of fusion power for 500 seconds or longer during each individual fusion experiment and in doing so demonstrate essential technologies for a commercial reactor.

But they are all agreed that taming the power of the Sun will not be easy.

The superhot gas in which the fusion takes place is notoriously difficult to control.

The gas, termed a plasma, has to be kept hot and contained for fusion to take place. So far no one has achieved a prolonged self-sustaining fusion event.

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