BBC NEWS

France gets nuclear fusion plant

France will get to host the project to build a 10bn-euro (£6.6bn) nuclear fusion reactor, in the face of strong competition from Japan.

The International Thermonuclear Experimental Reactor (Iter) will be the most expensive joint scientific project after the International Space Station.

The Iter programme was held up for over 18 months as parties tried to broker a deal between the two rivals.

Nuclear fusion taps energy from reactions like those that heat the Sun.

Nuclear fusion is seen as a cleaner approach to power production than nuclear fission and fossil fuels.

> **Rapid construction of Iter will be a major step in the development of fusion as a potential large-scale source of electricity that will not contribute to climate change**
> Prof Sir Chris Llewellyn Smith, UKAEA

Officials from a six-party consortium signed the deal in Moscow on Tuesday, for the reactor's location at the Cadarache site in southern France.

French President Jacques Chirac thanked member countries of the European Union, as well as Russia and China, who crucially lent their support to the French bid: "It is a big success for France, for Europe and for all the partners of Iter," he said in a statement.

The European Union, the United States, Russia, Japan, South Korea and China are partners in the project.

Japan earlier withdrew its bid, after a deal was worked out for the "runner-up" to receive a generous concessions package.

Rich reward

According to the package, Japan will get 20% of the project's 200 research posts while providing only 10% of the expenses, and host a related materials research facility - of which half the construction costs will be shouldered by the EU.

"We believe that the Iter project should start as soon as possible for the sake of mankind's future," said Nariaki Nakayama, Japan's science minister.

Janez Potocnik, EU commissioner for science and research, said that now a consensus had been reached, "we will make all efforts to finalise the agreement on the project, so that construction can begin as soon as possible".

Professor Sir Chris Llewellyn Smith, director of UK Atomic Energy Authority's (UKAEA) Culham division, which is responsible for the UK's thermonuclear fusion programme, said the decision was "wonderful news".

"Rapid construction of Iter will be a major step in the development of fusion as a potential large-scale source of electricity that will not contribute to climate change," he added.

And the UK's science minister, Lord Sainsbury, said: "I am delighted that the six international parties

collaborating in the Iter fusion project are now agreed on a way forward and that Iter is to be located in France.

"Making fusion a viable energy source for mankind is an enormous scientific and technological challenge. The Iter project is an important step in making energy from fusion a reality," he told the BBC News website.

Earthbound star

The Cadarache site lies about 60km (37 miles) inland from Marseille, and has been a nuclear research centre ever since president Charles de Gaulle launched France's atomic energy programme in 1959.

ITER - NUCLEAR FUSION PROJECT

Project estimated to cost 10bn euros and will run for 35 years
It will produce the first sustained fusion reactions
Final stage before full prototype of commercial reactor is built

Local politicians were delighted by the announcement, because it will guarantee thousands of jobs over the coming years.

However, some environmental groups are doubtful about the viability of nuclear fusion, and have warned that Cadarache lies on a known earthquake faultline. The management at Cadarache insists there is no risk to existing or future installations.

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

It would be the first fusion device to produce thermal energy at the level of conventional electricity-producing power stations, and would pave the way for the first prototype commercial power station.

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

To use controlled fusion reactions on Earth as an energy source, it is necessary to heat a gas to temperatures exceeding 100 million Celsius - many times hotter than the centre of the Sun.

The technical requirements to do this, which scientists have spent decades developing, are immense. But the rewards, if Iter can be made to work successfully, are extremely attractive.

One kilogram of fusion fuel would produce the same amount of energy as 10,000,000 kg of fossil fuel.

Fusion does produce radioactive waste but not the volumes of long-term high-level radiotoxic materials that have so burdened nuclear fission.

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