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Published online: 28 June 2005; | doi:10.1038/news050627-5

France wins fusion project

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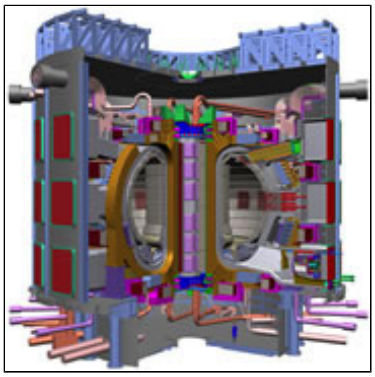
Decision over siting of ITER is made at long last.

An 18-month deadlocked contest between Japan and Europe over who gets to play host to a US$5.5-billion experimental fusion reactor has finally come to an end. After much political back-and-forth, rumours and anticipation, the winner is France.

On Tuesday 28 June, Japan bowed aside at a meeting of the six international partners in Moscow. Cadarache, in southern France, will be the site of the nuclear reactor known as ITER. In return, Japan was promised a host of benefits, including contract work, a significant leadership role, and support for hosting the next fusion project.

Today's nuclear power comes from fission, a process by which heavy, radioactive elements such as uranium break apart and convert some of their mass into energy. But researchers anticipate that a much better source of energy would be the reverse process: fusion. This occurs when very light elements combine, such as hydrogen fusing to make helium.

Unlike fission plants, a fusion reactor would not be vulnerable to meltdowns and its fuel could not be turned into nuclear bombs. Perhaps the biggest attraction of fusion is that the waste from a plant would only be radioactive for about a hundred years, rather than for hundreds of thousands of years.



The ITER fusion reactor aims to heat a mass of gas plasma to 200 million °C.

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What you get out

However, it takes intense conditions to fuse elements as they do in the centre of the Sun. Despite more than 50 years of research, scientists have not yet been able to make a fusion reactor here on Earth that produces more energy than they put in. But that's the goal of the long-planned ITER project.

ITER aims to heat a mass of gas plasma to 200 million °C, and hold it in mid-air with powerful magnetic fields. This doughnut-shaped mass is expected to produce 400-700 megawatts of heat within the few minutes that it stays stable, which would be more than enough to power a town. If all goes to plan, ITER will generate five to ten times more energy than is put in to it.

Once that principle is proven, researchers hope to take the next step and build a prototype fusion reactor called DEMO. This would convert the heat produced by fusion into useful electricity.

Stalemate

Russia, the United States, Europe and Japan agreed on the importance of building ITER in the late 1980s. But it has taken decades to convince all the parties involved that it was possible and affordable. For the past year and a half the argument has been over who would get to host it. The project carries much prestige, along with billions of dollars in construction, work for physicists and other contracts.

After much negotiation, it has finally been decided that France will take the site. As part of this deal, the European Union will pay half of ITER's construction costs. The other partners will pay 10% each, mostly in the form of equipment and components. Japan will be given contracts to produce 20% of the project's components.

Europe also agreed to support the nomination of a Japanese director-general for the organization that will be created to run the programme. And Japan will have a larger share of scientists working on the machine that it would be entitled to on the basis of its 10% contribution. Using a large chunk of European funding, Japan will host a facility to work towards the DEMO project, and Europe has promised to support any bid by Japan to host the reactor.

The deal must still be ratified by member parliaments, a process that will probably take months. If all goes smoothly, construction should begin later this year. "Frankly, ITER has got to go forward pretty quickly, or the negotiators will die of old age," says David Baldwin with General Atomics, a private company in San Diego, California, that has a government contract to do fusion research.

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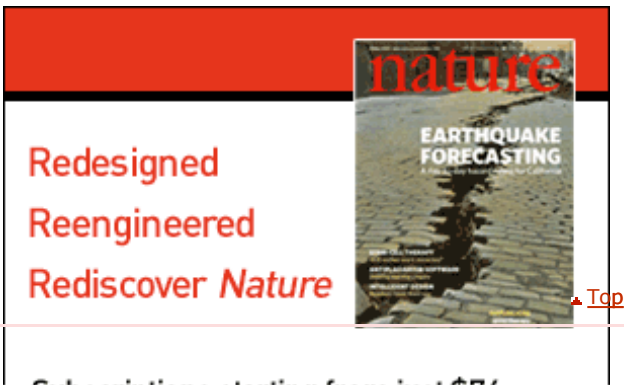

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