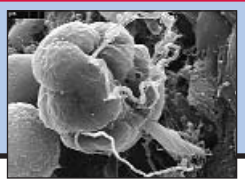
NEWS

This Week



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No Meeting of the Minds on Fusion Megaproject

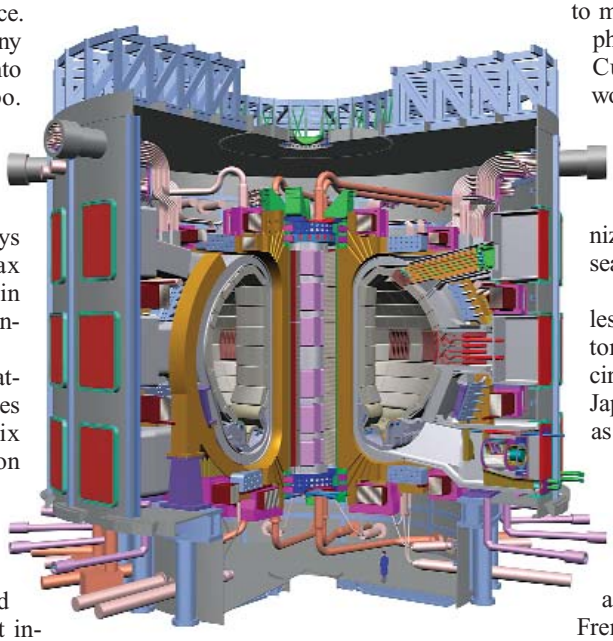
CAMBRIDGE, U.K.—It was supposed to be a banner day for the world's nuclear fusion community. After 18 years of study, experiment, and debate, politicians gathered in Washington, D.C., just before the holidays to give the long-awaited green light to a $5 billion reactor project that would demonstrate fusion's potential to generate almost limitless amounts of power. But on 20 December, there was no joyous announcement to ring in the new year. Half of the partners behind the International Thermonuclear Experimental Reactor insisted that ITER be sited in Japan, and the other half backed a site in France.

The standoff put the signing ceremony on hold and has thrown the project into an acrimonious and dangerous limbo. Negotiators have returned to their capitals for another month of deliberations amid accusations of political bias and smear campaigns. "If [the indecision] goes on much longer," says Alex Bradshaw, director of the Max Planck Institute for Plasma Physics in Garching, Germany's biggest fusion center, "it will start harming the project."

Last month's debacle was a frustrating climax to years of behind-the-scenes negotiations. Officials from the six partners—China, the European Union (E.U.), Japan, Russia, South Korea, and the United States—had whittled down the list of potential sites, roughly divvied up the cost of building and operating the reactor, and worked out ways to manage an effort involving thousands of researchers.

But in the end it came down to a staring contest, and neither side blinked. Russia and China supported the E.U.'s candidate of Cadarache in southern France, whereas the United States and South Korea favored Rokkasho in northern Japan. "We wanted the meeting to be a technical comparison of the two sites, but there was no real exchange of views," says Achilleas Mitsos, the E.U.'s director-general of research. Despite Russia's stab at a compromise—it suggested splitting the reactor from other elements so that each candidate site would gain something—the meeting ended in a deadlock. A working group is now studying the Russian proposal, and proponents of the two sites will spend January addressing additional technical questions.

One thing the ITER partners can agree on is the project's potential payoff. Researchers are convinced that with enough heat and pressure, they can fuse deuterium and tritium into helium in a reaction that would shed prodigious energy. But achieving the necessary hundreds of millions of degrees inside ITER's 6.2-meter-wide tokamak, a doughnut-shaped reactor vessel, will take many new technologies, including reliable superconducting magnets and heat- and radiation-tolerant materials. If ITER gets the go-ahead in 2004, it is expected to fire up in 2014 and cost $10 billion over its 30-year lifetime.



In the wrong kind of flux. ITER's partners can't decide where to site the tokamak.

With those stakes, political pressures approach tokamak-like ferocity. Press reports suggest that the United States supports Japan because it does not want to award such a prize to France after its opposition to the Iraq war. U.S. and Japanese officials deny that claim. "That sort of nonsense really gets us angry," says Satoru Ohtake, head of fusion energy at Japan's education ministry. But doubts linger. "The U.S. says its decision is not political," says Mitsos. "I'm not convinced, but we have to take their word for it."

Russia's attempt to broker a peace deal involved weaving in a planned fusion lab that is not part of ITER. The International Fusion Materials Irradiation Facility is a $600 million particle accelerator designed to produce high-energy neutrons, just the sort of radiation that would bombard the interior walls of a fusion reactor. The idea is to use it to study degradation of materials in future commercial reactors. Other elements that could be sited separately from the tokamak include a computer simulation center and the reactor's control room. Russia's overture is "a positive step psychologically. We want to make this a world project," says Christopher Llewellyn Smith, head of the U.K.'s Culham Laboratory, home of JET, the world's largest tokamak. But some politicians used the proposal to support their claim to the ITER tokamak. "We recognize the capacity of Japan in supercomputers. Japan [should] recognize our capacity in fusion," says E.U. research commissioner Philippe Busquin.

Other anonymous officials were even less generous. Shortly before the Washington meeting, an unsigned document was circulated to all the delegations apart from Japan describing the merits of Cadarache as well as many claimed shortcomings of Rokkasho, including high costs of labor and electricity, seismic risk, and lack of infrastructure. "This gave us a shock. The way this was done was not fair," says Nobuhiro Muroya, science attaché at Japan's embassy in Paris. French and E.U. officials who spoke with *Science* say they know nothing of the document's origins. Smearing their rivals would be "a very bad tactic," says Jean Jacquinot, head of France's fusion program. "In the end, we must all work together."

The partners hope to find common ground and reconvene politicians in February to anoint a home for ITER. "We can wait another month or two," says Jacquinot. Any longer, though, and political fusion may be harder to achieve than the nuclear variety.

–DANIEL CLERY

With reporting by Charles Seife in Washington, D.C., Dennis Normile in Tokyo, and Barbara Casassus in Paris.

CREDIT: ITER