FUSION

U.S. will join ITER collaboration once again

The United States will contribute about 10 percent of the ITER project's cost—about $500 million of the $5-billion total cost.

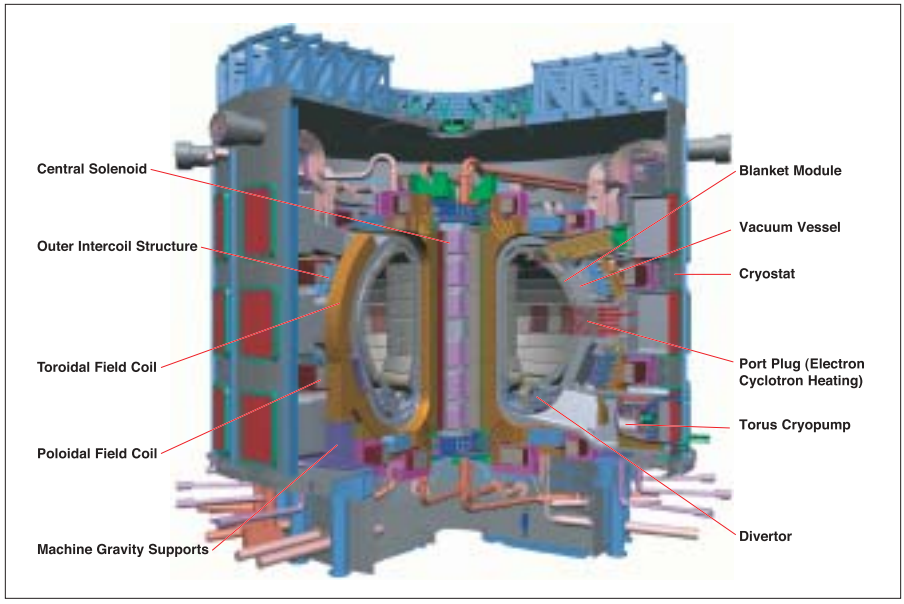
FOUR YEARS AFTER abandoning the undertaking, the United States has announced it will rejoin the negotiations for construction and operation of the power reactor–scale ITER international fusion research project. The United States plans to contribute around 10 percent of the project's total construction cost—which comes to $500 million for the anticipated $5-billion project. ITER (International Thermonuclear Experimental Reactor), which could begin construction in 2006 and be operational by 2014, is expected to be the focal point of burning plasma research around the world.

"This international fusion project is a major step towards a fusion demonstration power plant that could usher in commercial fusion energy," Energy Secretary Spencer Abraham said on January 30 at Princeton Plasma Physics Laboratory (PPPL), where he made the announcement. "ITER also provides a cost-effective way to proceed with fusion research worldwide, with the collaborating parties sharing in the project's cost of construction and operation."

ITER is intended to demonstrate essential fusion energy technologies and test key elements required to use fusion as a practical energy source. It will provide 500 megawatts of fusion power for 500 seconds or longer during each individual fusion experiment, and will be the first fusion device to operate at such a high power level for long-duration experiments. The fusion power produced in the ITER plasma is expected to be 10 times greater than the external power added to the plasma.

Canada, the European Union, Japan, and Russia have proceeded on planning ITER construction and operation for much of the last decade. China has recently joined the negotiations and has offered also to contribute about 10 percent of the project's cost, according to the January 23 issue of the journal *Nature*. A construction site has not yet been chosen, but candidate sites in Canada, Europe, and Japan have been offered.

The United States had been a member of the negotiations but left the project in 1999 because of its high projected cost, which has since been cut in half. The current construction cost for ITER, including buildings, hardware, installation, and personnel, is estimated to be about $5 billion in constant 2002 dollars. In January 2002, Office of Science and Technology Policy director John Marburger publicly reopened the possibilities for U.S. involvement when he told reporters, "our participation [in ITER] should be reconsidered."



A view of the ITER design (Source: ITER)

The Bush administration believes that fusion is a key element in U.S. long-term energy plans because fusion offers the potential for safe and environmentally benign energy. "The results of ITER will advance the effort to produce clean, safe, renewable, and commercially available fusion energy by the middle of this century," President George W. Bush said on January 30. "Commercialization of fusion has the potential to dramatically improve America's energy security while significantly reducing air pollution and emissions of greenhouse gases."

ITER—which was first conceived by the Soviets during the November 1985 Geneva Summit Meeting between President Reagan and Soviet Union leader Mikhail Gorbachev—will be based on the tokamak concept, a toroidal (doughnut-shaped) magnetic configuration. In ITER, superconducting magnet coils around a toroidal vessel will confine and control the plasma and induce an electrical current through it. Fusion reactions will take place when the plasma is hot enough, dense enough, and contained long enough for the atomic nuclei in the plasma to start fusing.

Although the United States is proposing to provide a number of hardware components for ITER construction, the nature and details of the U.S. participation and contributions are to be determined during the negotiations. DOE's Office of Science will lead the U.S. negotiations on ITER.

During his talk to PPPL employees, Abraham pledged that U.S. involvement in ITER will not detract attention from domestic fusion programs. "[L]et me be clear, our decision to join ITER in no way means a lesser role for the fusion programs we undertake here at home. It is imperative that we maintain and enhance our strong domestic research program. . . . Critical science needs to be done in the U.S. in parallel with ITER to strengthen our competitive position in fusion technology," Abraham said.

U.S. Rep. Rush Holt (D., N.J.), a former assistant director at PPPL, commented, "Although rejoining ITER is a step forward, I want to issue a warning to the administration against diverting current domestic funding for fusion to ITER. For fusion to meet its great promise, the U.S. must make sure to invest as much in its domestic research as it does in ITER."