

The Times

U.S. rejoins plan for fusion reactor

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By ROBERT STERN

PLAINSBORO - After a five-year hiatus, the United States next month will rejoin international negotiations to develop fusion energy as a commercial power source, U.S. Energy Secretary Spencer Abraham said yesterday.

U.S. participation in construction of the \$5 billion project would cost an estimated \$500 million in constant 2002 dollars over a 10-year period, according to the Department of Energy.

Abraham made the announcement during a visit to the Princeton Plasma Physics Laboratory (PPPL) here. The lab, which is run jointly by Princeton University and the DOE, is considered the nation's premier fusion-research center.

It would be a central element of the U.S. contribution to ITER, the International Thermonuclear Experimental Reactor, the name for the proposed international collaboration project, a top DOE official said.

"This lab will play a major role in the project design and management," said Raymond Orbach, director of the DOE's office of science.

Exactly what the U.S. and PPPL's role in the project will be would be determined through international negotiations.

PPPL director Robert Goldston will join DOE officials during the negotiations, which resume Feb. 19 in St. Petersburg, Russia, Abraham said.

If the experiments work as planned, ITER would be the precursor to a prototype plasma fusion power plant. But such a power plant likely isn't feasible for at least 35 years, said Edmund Synakowski, a leading PPPL physicist.

Research already under way at PPPL is designed to build on ITER, if that project proves successful, Synakowski said.

"Now is the time to expand our scope and embrace international efforts to realize the promise of fusion energy," Abraham said.

Canada, the European Union, Japan and Russia are the current members committed to ITER. China recently joined the negotiations as well.

"By the time our young children reach middle age, fusion may begin to deliver energy independence and energy abundance to all nations, rich and poor," Abraham said. "Fusion is a promise for the future (that) we cannot afford to ignore."

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Fusion power relies on an abundant fuel source - hydrogen. It produces no greenhouse gases and lower levels of radioactive waste than traditional fission nuclear reactors.

The president's energy policy also calls for other fusion research projects at Princeton and other universities and DOE labs to be given higher priority, Abraham said.

He declined to specify how much new funding Bush will seek because the DOE's proposed budget will be released Monday.

ITER would provide a record 500 megawatts of fusion power for at least 500 seconds, a little more than eight minutes, during each experiment. That would meet the power needs of about 140,000 homes.

By comparison, the current fusion energy record is a 16-megawatt pulse that lasted less than a second produced by the Joint European Torus experimental fusion generator in England, said N. Anne Davies, the DOE's associate director for fusion research.

Building of ITER would start in 2006 and the generator would be operational for 20 years beginning in 2014, under current projections.

Like the existing experimental plasma fusion generators at PPPL and elsewhere, ITER wouldn't provide electricity to a power grid.

And the Bush administration isn't interested in having ITER located at PPPL or anywhere else in the United States, Abraham said.

That's because officials estimate the host country will have to fund \$2 billion of the project's \$5 billion building costs up front to develop the ITER site, Orbach said. Its yearly operational costs are estimated at about \$500 million but the United States doesn't plan to take part in funding ITER's operation, he said.

On the other hand, ITER's host country would benefit from new job opportunities and the

advantage of having the technology in the experimental fusion reactor close at hand, he said.

Canada, the European Union and Japan are vying to host ITER. The location for the experimental generator will be a key issue to be decided through negotiations that are expected to take at least seven or eight months.

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The United States joined the planning for ITER in 1991 but withdrew in 1998.

Doubts that the design at the time would work as planned, concern that its then-estimated \$10 billion construction cost was excessive and a political stalemate over where it should be built led the United States to end its involvement.

But progress since then in ITER's planning and advances in fusion research justify the Bush administration's decision to reverse the U.S. position, while stopping short of a commitment to help fund the project, Orbach said.

The ITER partners - building in part on scientific advances at PPPL - have redesigned the project's fusion generator so it will be more energy-efficient and built for about half the projected cost of the initial design, he said.

Rep. Rush Holt, D-Hopewell Township, welcomed the decision to return the United States to the ITER discussions.

But Holt warned that the administration shouldn't wield it like a double-edged sword.

"I worry that some people who don't want to make a major investment (in alternative-energy research, including fusion) will use international cooperation as an excuse for the U.S. to do less, when in fact it is imperative for the U.S. to do more domestically," Holt said.

"There should be a timetable for constructing the next American experiments," Holt said. "That timetable doesn't exist . . . (and) we don't want to put all of our eggs in one basket."

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Abraham said the Bush administration doesn't intend to pursue ITER at the expense of other fusion research.

"Our decision to join ITER in no way means a lesser role for the fusion programs we undertake here at home," Abraham said. "It is imperative that we maintain and enhance our strong domestic research program here at Princeton, at the universities and at the other labs."

"Critical science needs to be done in the U.S., in parallel with ITER, to strengthen our competitive position in fusion technology," he said.

Holt said the United States was right to withdraw from ITER in 1998, given the costs and scientific doubts about the project then.

But he said the government should have done much more to beef up its funding for domestic fusion research then.

Alternative energy research, excluding fusion, received \$1.31 billion in federal funding in the 2003 fiscal budget, Abraham said.

Another \$257 million is set aside just for fusion research, he said.

Holt contends that because national energy expenditures in the United States are about \$800 billion per year, private and public funding for research and development of fusion and other potential alternative energy resources to fossil fuels should be at least \$8 billion per year.

That's about double the current level of national investment in research and development of alternate energy sources, he said.

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