After Election 2014: FUSION RESEARCH

This story is the fourth in Science*Insider's* ***After Election 2014*** *series. Until Election Day on 4 November, we will periodically examine research issues that will face U.S. lawmakers when they return to Washington, D.C., for a lame-duck session and when a new Congress convenes in January. Click here to see all the stories published so far; click here for a list of published and planned stories.*

Today, a look at the growing controversy surrounding U.S. funding for the international fusion experiment ITER.

Should we stay or should we go? Once the voters have spoken, that's the question Congress will have to answer regarding the United States' participation in ITER, the hugely overbudget fusion experiment under construction in Cadarache, France. Some lawmakers say it may be time for the United States to bow out, especially as the growing ITER commitment threatens to starve U.S.-based fusion research programs. The next Congress may have to decide the issue—if the current one doesn't pull the plug first when it returns to Washington, D.C., for a 6-week lame-duck session.

For those tired of the partisan squabbling on Capitol Hill, the ITER debate may provide curious relief.

ITER appears to enjoy bipartisan support in the House of Representatives—and bipartisan opposition among key senators.

ITER aims to prove that nuclear fusion is a viable source of energy, and the United States has agreed to build 9% of the reactor's hardware, regardless of the cost. Recent estimates suggest the U.S. price tag could be $3.9 billion or more—nearly quadrupling original estimates and raising alarm among some lawmakers. In response, this past June a Senate appropriations subcommittee proposed a budget bill that would end U.S. participation in the project next year. In contrast, the next month the House passed a bill that would increase U.S. spending on ITER.

Some observers think the current Congress will kick the issue to the next one by passing a stop-gap budget for fiscal year 2015, which began 1 October, that will keep U.S. ITER going. "I don't think in the end they can come out and kill ITER based on what the Senate subcommittee did," says Stephen Dean, president of Fusion Power Associates, a research and educational foundation in Gaithersburg, Maryland. Others say a showdown could come by year's end.

Trouble over ITER has been brewing for years. ITER was originally proposed in 1985 as a joint U.S.-Soviet Union venture. The United States backed out of the project in 1998 because of cost and schedule concerns—only to rejoin in 2003. At the time, ITER construction costs were estimated at $5 billion. That number had jumped to $12 billion by 2006, when the European Union, China, India, Japan, Russia, South Korea, and the United States signed a formal agreement to build the device. At the time, ITER was supposed to start running in 2016. By 2011, U.S. costs for ITER had risen to more than $2 billion, and the date for first runs had slid to 2020. But even that date was uncertain; U.S. ITER researchers did not have a detailed cost projection and schedule—or performance baseline—to go by.

Then in 2013, the Department of Energy (DOE) argued in its budget request for the following year that U.S. ITER was not a "capital asset" and therefore did not have to go through the usual DOE review process for large construction projects—which requires a performance baseline. Even though DOE promised to limit spending on ITER to $225 million a year so as not to starve domestic fusion research efforts, that statement irked Senators Dianne Feinstein (D–CA) and Lamar Alexander (R–TN), the chair and ranking member of the Senate Appropriations Subcommittee on Energy and Water Development, respectively. They and other senators asked the Government Accountability Office (GAO) to investigate the U.S. ITER project.

This year, things appeared to come to a head. This past April, researchers working on U.S. ITER released their new $3.9 billion cost estimate and moved back the date for first runs to 2024 or later. Two months later, GAO reported that even that new estimate was not reliable and that the cost to the United States could reach $6.5 billion. Based on that report, the Senate energy and water subcommittee moved to kill U.S. ITER in its markup of the proposed 2015 budget, giving it only $75 million for the year, half of what the White House had requested and just enough to wind things down. Alexander supported the move, even though the U.S. ITER office is based in his home state of

Tennessee, at Oak Ridge National Laboratory.

ITER still has friends in the House, however. In their version of the DOE budget for 2015, House appropriators gave ITER $225 million, $75 million more than the White House request. Moreover, the project seems to have bipartisan support in the House, as shown by a hearing of the energy subcommittee of the House Committee on Science, Space, and Technology. Usually deeply divided along party lines, the subcommittee came together to lavish praise on ITER, with representative Lamar Smith (R–TX), chair of the full committee, and Representative Eric Swalwell (D–CA), the ranking member on the subcommittee, agreeing that ITER was, in Swalwell's words, "absolutely essential to proving that magnetically confined fusion can be a viable clean energy source." Swalwell called for spending more than $225 million per year on ITER.

When and how this struggle over ITER plays out depends on the answers to several questions. First, how will Congress deal with the already late budget for next year? The Senate, controlled by the Democrats, has yet to pass any of its 13 budget bills, including the one that would fund energy research. And if the House and Senate decide to simply continue the 2014 budget past the end of the year, then the decision on ITER will pass to the next Congress. If, on the other hand, Congress passes a last-minute omnibus budget for fiscal year 2015, then the fight over ITER could play out by year's end.

Second, how sincere is the Senate move to kill ITER? The Senate subcommittee's move may have been meant mainly to send a signal to the international ITER organization that it needs to shape up, says one Democratic staffer in the House. The international ITER organization received scathing criticism in an independent review in October 2013. That review called for 11 different measures to overhaul the project's management, and the Senate's markup may have been meant primarily to drive home the message that those measures had to be taken to ensure continued U.S. involvement, the staffer says.

Third, how broad is the House's support for ITER? Over the past decade or so, the House has been more supportive of fusion in general, the Democratic staffer says. But some observers credit that support mainly to one person, Representative Rodney Frelinghuysen (R-NJ), a longtime member of the House Appropriations Committee. "Over the years he's become a champion of fusion," Dean says. "He protects it in the House." Dean and others say that's likely because the DOE's sole dedicated fusion laboratory, the Princeton Plasma Physics Laboratory (PPPL), is in his home state of New Jersey (but not Frelinghuysen's district).

Indeed, observers say that Frelinghuysen has been instrumental in preventing cuts to the domestic fusion program proposed by DOE itself. For example, for fiscal 2014, DOE requested $458 million for its fusion energy sciences program, including $225 million for ITER. That meant cutting the domestic fusion program by about 20% to $233 million and closing one of three tokamak reactors in the United States. The Senate went along with those numbers, but House appropriators bumped the budget up to $506 million, the number that held sway in the final 2014 spending plan. But some observers speculate that Frelinghuysen might be willing to let ITER go if he could secure a brighter future for PPPL.

Finally, the biggest question surrounding U.S. participation in ITER is: How will the international ITER organization respond to the calls for changes in its management structure? That should become clear within months. So far, officials with U.S. ITER have not been able to produce a baseline cost estimate and schedule in large measure, because the ITER project as a whole does not have a reliable schedule. The international ITER organization has said it will produce one by next July, the House staffer says. And if the international organization doesn't produce a credible schedule, the staffer says, "the project will be very difficult to defend, even by its most ardent supporters."

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