

# End of the line for U.S. fusion program?

by Mark Wilsey

In the current environment of shrinking budgets, U.S. fusion policymakers seem to have conceded that at current funding levels, any timeline for the development of fusion energy must be given up, and that the United States may cease to be the world's leader in fusion research.

In January, the Fusion Energy Advisory Committee (FEAC) of the Department of Energy issued its report on "a restructured fusion energy sciences program." The report was requested by DOE Director of Energy Research Martha Krebs, in order to help determine what could be salvaged of the U.S. magnetic fusion program, which was savaged by Congressional budget cuts this year.

The budget for fiscal year 1996 is \$244 million, some \$113 million lower than the FY 95 funding level, and far short of the administration's \$366 million request. Congress has indicated that there is little prospect for increased funding for fusion over the next several years, and the DOE is now forced to drastically down-size the magnetic fusion program. However, it is clear that the viability of the program could be placed at risk.

In December 1995, the FEAC began deliberations on a strategic plan for fusion research. It was asked to formulate a policy for restructuring the U.S. fusion program to fit funding levels ranging from \$200-275 million, and to recommend what elements of the program should be preserved. The DOE was already planning a "bare bones" operation of its fusion facilities, meaning no upgrades to the machines, and perhaps limiting operations to only a few weeks or days.

## The FEAC report

The bulk of the FEAC report dealt with what would be the likely scenario if the fusion budget for FY 97 was \$250 million. A major consequence would be that the Tokamak Fusion Test Reactor (TFTR) at the Princeton Plasma Physics Laboratory (PPPL) would have to cease operations, thus "foregoing the remaining unique scientific output possible from that facility," the FEAC reports.

This would be a double blow to Princeton. It was hoped that the TFTR could be pressed into a couple of more years of service, because its replacement, the Tokamak Physics Experiment at Princeton, was canceled last year.

The FEAC report reflects the DOE's effort to reorient the fusion program to pursue basic plasma science research. This to be done through increased theoretical work, computational

simulations, and alternative fusion concepts. To that end, the FEAC recommends that Princeton could provide the leadership for such a restructured fusion science program, so that, somewhere down the line, if funding remains constant, there may be an opportunity for "one or two smaller but scientifically aggressive new facilities," one of which takes advantage of the infrastructure at PPPL, FEAC envisions.

The rest of the FEAC's scenario for FY 97, with the shutdown of the TFTR, would call for smaller facilities, the DIII-D at General Atomics in San Diego and C-Mod at the Massachusetts Institute of Technology, to be pressed into "maximal productive utilization." They also foresee, again depending on funding, that there could be some future upgrades to DIII-D and C-Mod.

At \$275 million in FY 97, a funding level that the FEAC would like to recommend, it would be possible to operate the TFTR for another year and meet U.S. obligations on the International Thermonuclear Experimental Reactor (ITER). However, at \$200 million, there would not only be a further reduction in U.S. contributions to the ITER, but that funding level would likely reduce the U.S. program to only one major operating facility.

## What about the ITER?

The ITER project is an international program among the United States, European Union, Japan, and Russia. It will be a huge machine, designed to experiment with sustained burning plasmas under reactor conditions.

Currently, the ITER is in its engineering design phase, which runs until 1998. The United States is firmly committed, by international agreements, to this work. The U.S. share comes to more than \$80 million in FY 96. However, with the reduced budget, the United States can put in \$60 million or less, the shortfall to be covered either by deferring payments or by modifying the fusion work to make use of other program resources.

The FEAC recommends that the United States continue to participate in the engineering design phase of the ITER, but at a lower level. But what happens after 1998, when ITER's construction phase begins, and the U.S. share increases to hundreds of millions of dollars per year? In the current budget climate, it is clear to the FEAC that the United States is "very unlikely to participate as a full partner in ITER." It suggests that the United States may have to participate as a "limited financial partner."

Last summer, the President's Committee of Advisers on Science and Technology issued a report which examined the U.S. fusion program. Part of its recommendations was that the United States should try to talk down the cost of the ITER. But even if the costs were reduced 40-60%, the United States still could not pay its share. The dilemma is, that should the United States back out of the ITER, it would send a message that it is not a reliable partner, and could lead to a collapse of the project, damaging fusion research efforts worldwide.