

Editorial

Time to get going on fusion

The Clinton administration has an opportunity to reverse the policies of the two previous administrations, and allow thermonuclear fusion research to move forward. In 1980, the Congress passed and President Carter signed into law the Magnetic Fusion Energy Engineering Act, legislating that producing vast amounts of energy using components of seawater for fuel merited a level of effort which would allow it to develop new fusion energy technologies. But neither the Reagan nor Bush administration supported a level of funding which would have allowed the fusion program to advance.

Today, the magnetic fusion energy program has a budget which is *one-half* of what it was in 1980, in real dollars. No wonder that fusion scientists as well as congressional representatives feel that the program is not going forward, and are proposing various, sometimes counterproductive, solutions.

One danger is that history will repeat itself yet again, and the new administration will want a new "review" of the fusion program. Such a review is unnecessary, and simply wastes precious time.

Dr. Stephen Dean, president of Fusion Power Associates, stated in an interview which will appear in the Summer issue of *21st Century Science & Technology* magazine, that the Fusion Energy Advisory Committee (FEAC) of the U.S. Department of Energy (DOE) has prepared a series of reports for priorities and budget requirements in the fusion program.

A decade ago, the Tokamak Fusion Test Reactor (TFTR) located at Princeton University was scheduled to complete the task it was designed and built for—to produce up to 10 megawatts of thermonuclear fusion energy, using a donut-shaped tokamak machine, by burning deuterium and tritium fuel (isotopes of hydrogen). The first priority of the program, the FEAC states, is to perform those tests *this year*.

The second priority is to participate in the design of the International Thermonuclear Experimental Reactor project (ITER), which is being planned by the United States, western Europe, Japan, and Russia. This is envisioned to be a very large tokamak device, partly because, as a "consensus" machine to be built with the participation of many nations, it will have to be "many

things to many people."

There is also the need to reinvigorate the national fusion program, the committee says, by designing and building a machine to supersede the TFTR. The proposed successor is the Tokamak Physics Experiment (TPX), which will address scientific and technical questions which could permit the tokamak to be a smaller device than present engineering would permit.

There is also a proposed change in policy, which would reestablish research and development work in concepts other than the mainline tokamak design. Due to budget cuts, the Department of Energy made the decision a couple of years ago to stop work, and in some cases *shut down operating machines*, which were promising, but less advanced, than the experiments using tokamaks.

Dean chaired a panel for the advisory committee which examined these non-tokamak "alternative concepts." The panel recommended that a modest, but inviolable, budgetary commitment be made to concepts which were under development in the past—such as the stellarator and reversed-field pinch—as well as innovative concepts which are more risky but may be promising. It recommended that a specific amount of money be earmarked in the budget each year. This could 5-25% of the budget, Dean explains, but would be set and adhered to.

Less thoughtful proposals have been made by frustrated fusion supporters in the scientific community and Congress. One is to shut down the entire fusion program, except for the research for the ITER project. That way, they say, at least something would finally get done. There is also a proposal for the opposite approach—stop work on the tokamaks and end participation in the ITER, so that money can be put into another approach.

The only program that will produce breakthroughs in fusion is the balanced one that Dean describes. Just as the space program has been faced for years with budgets that do not adequately support both Space Station Freedom and innovative space science experiments, the solution cannot be to support one part of a program by lopping off parts of others.