

Scientists call on the administration to uphold the fusion-energy development law

by Marsha Freeman, Science & Technology Editor

The nation's fusion program is the most crucial energy development and scientific program administered by the Department of Energy. It holds the promise of providing unlimited energy for all nations in an environmentally benign and economical way.

Scientists in the U.S. fusion program have made important progress in the past few years, which spurred the Congress to pass legislation in 1980 which set goals and schedules for achieving the commercial demonstration of fusion power by the turn of the century. Since the beginning of the Reagan administration, Carter holdovers and budget-balancers have tried to slow down the fusion program's current rate of success as well as preclude the engineering and technology development required to move fusion from the laboratory to the utility grid by the year 2000.

In response to this attempt to ignore the will of Congress and the judgment of the nation's most prominent scientists and industry representatives, the fusion community has gathered managers of the various laboratory and industry programs, Congressmen who have led the move to accelerate the fusion effort, industry supporters, and the Fusion Energy Foundation to try to prevent this turning back of the scientific clock. Excerpted below is testimony presented before the Energy Research and Production Subcommittee of the House Committee on Science and Technology on March 24.

Why fusion?

In the fall of 1980, the House passed the Magnetic Fusion Energy Engineering Act by a vote of 365 to 7, and the Senate passed it by unanimous voice vote: a show of support unprecedented in the history of energy legislation.

The reason for the widespread support is the promise of commercial fusion energy. Fusion, the energy process of the Sun and the stars, is the fusing of hydrogen isotopes at temperatures near one hundred million degrees. These hydrogen isotopes are available from sea water and will never run out, nor can supplies be controlled by any nation.

The high-energy neutrons released in the process can be slowed down to deposit energy in the form of

heat, which is used to generate electricity in the conventional steam-turbine cycle.

In addition to producing electrical energy without the waste products from fossil fuels or nuclear energy, the hot gas (plasma) that is fused can be used directly in the separation and reduction of raw materials and minerals. Common rock and minerals which are not economically exploitable today will become the resources for tomorrow, opening the possibility of an end to wars and conflict over diminishing resources.

The Fusion Act commits the nation to a 20-year program to demonstrate fusion engineering feasibility in a Fusion Engineering Device by the year 1990 and commercial feasibility demonstration by the year 2000. It is estimated that about \$20 billion will need to be spent over this 20-year period to achieve these goals.

The Department of Energy carried out two reviews of the fusion program before the legislation was drafted. Congress also convened a panel of experts which recommended an acceleration of the fusion engineering effort to begin to move the program out of the laboratory and into industry, as the last DOE report had recommended.

Now the Reagan administration, led by anti-fusion representatives of the Office of the Science Adviser in the White House, is back-tracking and disobeying the law. Each of the statements presented to subcommittee Chairman Marilyn Bouquard (D-Tenn.) is an authoritative summary of the current state of fusion policy.

As is made clear in the testimony, if the fusion program is put back on a "science only" track with the premise that it will not be commercially viable for another 70 years, it will never be developed. The other advanced-sector nations have already made their commitment to develop fusion. Now U.S. policymakers must decide.

Former Rep. Mike McCormack of Washington, a chemical engineer, was the author of the Fusion Act and the organizer of congressional support for fusion during his five terms. He testified as follows:

There is a bit of background which may be appropriate at this time. I was appointed to the Joint Committee on Atomic Energy in 1973, at about the same

time that Dr. Robert Hirsch became director of the fusion program for the Atomic Energy Commission. Dr. Hirsch and I set out on a campaign to expand the magnetic fusion program. We agreed, and the Congress supported us in our belief, that this nation could convert the concept of magnetic fusion energy into reality within perhaps 25 years with an adequately funded coherent program of research, development, and demonstration.

When the Department of Energy was formed in 1977, Dr. Hirsch resigned, and Mr. Kintner replaced him as director of our fusion program. They worked together with me and the members of this Committee and other Committees of the House and Senate to increase funding for magnetic fusion research from about \$30 million in 1973 to about \$400 million by 1979. Our goal was always the demonstration of magnetic fusion electricity by about the year 2000.

The Fusion Advisory Panel was formed in 1979, chaired by Dr. Hirsch and composed of some of this nation's outstanding fusion scientists, along with equally brilliant engineers and industrial executives. The report of the Panel in 1980 led us in this subcommittee to draft the Magnetic Fusion Energy Engineering Act of 1980. As a result, the DOE's Energy Research Advisory Board ordered a special study of our bill, directed by Dr. Sol Buchsbaum.

It was the confidence, expressed in these reports, and the concurrent successes in plasma physics research in our research laboratories that convinced us that we should enact this legislation. . . .

Unfortunately, the DOE and the Office of Management and Budget have decided to ignore the law that we enacted, and to revert back to a "research only" policy for fusion; delaying the engineering initiatives called for in this Act. Because of this unauthorized attempt at policy reversal, the United States is already falling behind in this all-important area of energy engineering development.

The time has come for the Congress to insist that the spirit of the fusion law be followed and that at least a part of the funding planned for fusion engineering development be approved for FY83. This would mean increasing funding from \$455 million for this year to \$501 million for FY83. This, you will recognize, really only compensates for inflation. . . .

The law which the Congress enacted was built on careful consideration of what was necessary to move forward with a successful program of fusion engineering development and materials testing. It called for a funding level of FY82 of \$525 million rather than the \$455 million we are spending now; and it called for a 25 percent increase above the \$525 million for FY83. Thus, if the law itself were followed, the funding level for FY83 would be \$656 million. . . .

Several individuals in this administration, none of them directly responsible to the Congress or to the people of this country . . . have taken it upon themselves to undo the fusion engineering program that we in the Congress recognized as essential . . . attempting to abrogate the law that you wrote, and to totally disregard what the Congress has directed be done. . . .

I urge the members of this subcommittee to remember the leadership that you provided in the past, and to remember that the people of this country are looking to you, now, for the same leadership. . . .

Edwin Kintner was the director of the DOE fusion office for five years and resigned from the position last winter in response to the administration's refusal to carry out the law. His testimony follows:

At the time of the energy crisis in 1973, fusion had made significant progress to justify a major role in the energy plan known as Project Independence. That plan envisioned increased financial support for fusion. Its impetus resulted in budget levels for magnetic fusion increasing to \$316 million in FY77.

Since that time, real budgets through FY83, after adjustments for inflation, have decreased 24 percent. Nevertheless, with support of these resources, the United States established laboratories, facilities, and program strategy which gave it world leadership in this field—a leadership which had been exerted previously by the Soviet Union. . . .

The proposed FY83 budget is 24 percent below the FY77 budget in real buying power, and all the initiatives designed to carry out the recommendation of the DOE's Buchsbaum panel and the act are cancelled or postponed indefinitely. The completion of the Mirror Fusion Test Facility, which was to have made possible an informed comparison between toroidal and linear confinement concepts by the mid-1980's, has been postponed up to three years. The program is in imminent danger of being returned to a "science only" orientation.

All of this would be more readily understandable if the magnetic fusion program were failing technically or organizationally, but these recent actions have taken place despite continued impressive technical advances throughout the program.

What are the programmatic effects of this decision. . . ? 1) That date on which fusion can be counted on to mitigate the many and increasingly intractable problems of energy will be postponed at least year-for-year; 2) A consensus strategy based on high-level review and congressional support will be lost. 3) U.S. world leadership in fusion and the ability of the United States to work effectively within cooperative arrangements to strengthen world programs will be weakened; and 4) The potential of developments on the technology side of fusion which were pushing the state-

of-the-art in a number of technological areas . . . will be lost. . . .

It may be that this administration cannot afford to carry out the consensus plans laid out for fusion development; but no one should assume that not doing so will be without lasting consequences. The future will appear different within ten years, and it will be different within 25.

Dr. Stephen Dean is the president of Fusion Power Associates, an industry lobbying group for fusion. Dr. Dean was formerly the director for confinement systems in the DOE fusion program. He testified:

Industry has played an increasing role in fusion development. Today there are many industries with proven skills to contribute, indeed to provide leadership, to the engineering development phase of fusion. Key areas of industrial expertise include 1) system design, analysis, and management; 2) facility construction, component development, and manufacture; and 3) fusion facility operations.

A small increase in funding would permit maintenance of the engineering initiatives called for in the Fusion Act. The increases which I recommend be added, above the administration's FY83 request, are:

- \$10 million for formation of an industrially managed Center for Fusion Engineering;
- \$21 million for construction of the Elmo Bumpy Torus-P project by McDonnell Douglas Astronautics Corporation;
- \$15 million for construction of the Fusion Materials Irradiation Facility project by Westinghouse at the Hanford nuclear reservation;
- \$10 million for maintenance of cost and schedule for the MFTF-B project at Lawrence Livermore National Laboratory.

The Fusion Energy Foundation is the only public-interest group which is educating the public about the importance of fusion development as part of the nuclear technology chain vital to this nation's economic recovery and future economic growth. The FEF played a key role in organizing the public support which resulted in the overwhelming passage of the Fusion Act. The following was written testimony:

. . . If interest rates continue at their present heights, the federal budget deficit arising from interest payments alone will wreck the positive programs in the budget. For the first time in decades, the President did not actually make the budget; the budget was determined by the policies of the Federal Reserve Board and Federal Reserve head Paul Volcker's hidden agenda for "controlled economic disintegration." . . .

Unless reversed, the Federal Reserve's policies are certain to cause a collapse of federal revenues by mass bankruptcies and unemployment before Oct. 1, 1982, and a budget deficit of \$250 billion or more for fiscal

1983. Such a deficit will destroy the current budget, whatever its particular inadequacies.

Our testimony is based on the results of a series of detailed studies conducted by the Foundation over the past three years. These studies have shown:

1) The most significant single cause of the economic and social decline of the United States in the past decade is the lack of a "science driver" for the economy, with the demise of the Apollo program and NASA's fulfillment of that role in the late 1960s. . . .

2) This lack of a "science driver" has combined with increasing obsolescence in industry, monstrously high interest rates, a plague of drug addiction, and falling birth rates to produce the current depression.

3) The consequence of this situation is a serious and continuing decline in national security. We have today a military capable of, and prepared for, fighting only the most localized conventional wars, with the objective of controlling natural resources.

4) To remedy this increasingly grave predicament requires a combination of policy initiatives. We have concentrated on the critical role that science policy, specifically policy concerning advanced energy research can play in changing the direction of this country. The studies we have conducted document our conclusion that a program for fusion energy development, like the one mandated in the Magnetic Fusion Energy Engineering Act of 1980, would provide a large measure of the "science driver" required to renew the economy.

An adequate advanced nuclear fission research budget requires the expenditure of \$500 million more than what is proposed by the FY83 administration budget request. For magnetic fusion, we believe that a budget of \$660 million, rather than \$444 million, should be invested, to fulfill the mandate of the Act. This investment would be the first step toward the engineering realization of nuclear fusion.

Will the U.S. kill its fusion program?

The *Executive Intelligence Review* is making available testimony presented to Congress by the nation's fusion experts on March 23. These statements outline the need to accelerate the U.S. fusion program, rather than gut the most important energy R&D capability, as is being proposed.

The package includes testimony from:

- former Rep. Mike McCormack, author of the Fusion Act
- Edwin Kintner, former director of the DOE Fusion program
- Dr. Stephen Dean, President, Fusion Power Associates
- the Fusion Energy Foundation

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