Fusion bill moves to Senate

Margaret Sexton outlines the emerging final legislation and the energy potential it opens.

The U.S. House of Representatives passed legislation on Aug. 25 mandating a 20-year, $20 billion national commitment to the development of thermonuclear fusion energy, the energy process that powers the sun. The measure, H.R. 6308, introduced in January by Washington State's Mike McCormack, a Democrat, foresees development of commercial fusion energy by the 1990s, well ahead of the Carter administration's current timetable. It has been described by scientists and congressmen alike as possibly the single most important piece of legislation now before the U.S. Congress, because it points the way to an unlimited supply of energy "for all mankind, for all time."

A Senate bill that also speeds the timetable for fusion was introduced July 5 by its principal sponsor, Sen. Paul Tsongas (D-Mass.). As originally drafted, the bill, S. 2926, proposed a much slower rate of development for fusion than the McCormack bill. On Aug. 5, the Tsongas bill underwent a review process by fusion scientists and industry spokesmen who called for the bill to be amended to conform more closely to the provisions of the McCormack bill. If their recommendations are followed, the bills would be on the President's desk by Oct. 1, avoiding a lengthy process of compromise in the House-Senate conference committee that could water down the provisions of the much stronger McCormack bill.

In the Sept. 10 markup hearings held in the Senate Energy and Natural Resources Committee, the bill passed unanimously and is now ready to be sent to the Senate floor. The Tsongas bill was amended to bring it more in line with the McCormack bill, although it is still weaker in important ways than the McCormack bill.

The McCormack bill mandates the Department of Energy to develop a program to demonstrate the commercial feasibility of magnetic fusion energy by the year 2000, and authorizes $20 billion to achieve this over a 20-year period. The bill calls for a demonstration of engineering feasibility by 1987 with construction of an Engineering Test Facility. After that milestone is reached, the first experimental fusion power reactor would be developed by the year 2000 to produce net power and demonstrate that utility-based electricity generating power plants are ready for commercial deployment.

Tsongas bill amended

The original Tsongas bill called for a goal of placing a facility on line by the year 2005; as amended, the bill now calls for an on-line facility "by the turn of the 21st century." Most importantly, the funding for the Tsongas bill is substantially smaller than for the McCormack bill. As amended, the bill calls for a total of $500 million per year to be spent during the first five to seven years, with increases raising the amount appropriated ultimately to $1 billion per year. Washington sources report that this is as much as the administration is willing to spend, and the DOE's Office of Fusion Energy is said to be willing to compromise on this point.

The Tsongas bill originally called for separate program advisory boards for each of the national fusion laboratories to review the progress of the programs every year. During the Energy Committee's discussion of the bill, an amendment by Sen. Henry Bellmon (R-Okla.) was adopted that changed the bill to make such review boards survey the program every three years.

Further, mandatory advisory boards set up by the DOE have now been made optional. This will reduce the potential to subject the fusion program to bureaucratic bottlenecks.

The McCormack bill, titled the Fusion Energy Research, Development and Demonstration Act of 1980, passed by an overwhelming margin in the House in a vote of 365 to 7. With 160 cosponsors, the bill reflects a realization on the part of many members of Congress that the United States government has a responsibility to ensure future generations an unlimited supply of energy, and that the U.S. needs an effort as great as the commitment to the NASA Apollo manned space program of the 1960s.

The Tsongas bill also rapidly increased its list of sponsors, who now number 20 senators. The list includes 15 new senators of differing political outlook: Bill Bradley (D-N.J.); Harrison Williams (D-N.J.); Minority Leader Howard Baker (R-Tenn.); James Sasser (D-Tenn.); Pete Domenici (R-N.M.); Frank Church (D-Ida.); Daniel Moynihan (D-N.Y.); S.I. Hayakawa (R-Calif.); Robert Dole (R-Kan.); Barry Goldwater (R-Ariz.); Paul Laxalt (R-Nev.); Dale Bumpers (D-Ark.); Adlai Stevenson (D-Ill.); Spark Matsunaga (D-Hawaii); and Alan Cranston (D-Calif.).

The widespread support for the two fusion bills contrasts with the conservation, coal, and synthetic fuel energy legislation backed by the Carter administration that took nearly two years to move through Congress. The McCormack bill was voted on directly without debate. The near-unanimous vote reflects Congress' willingness to expedite an energy development program that promises a cheap and virtually inexhaustible source of energy using water as the fuel. The Tsongas bill is expected to be placed on the consent calendar, enabling it to be passed quickly, and without debate.

The fusion potential

The sun and the stars produce energy through fusion, combining the nuclei of isotopes of hydrogen in a process that releases tremendous amounts of energy. Burning the hydrogen isotopes in 1 gallon of seawater in a fusion reactor produces the equivalent amount of energy produced by burning 300 gallons of oil. The hot gas, or plasma, produced in fusion reactors can also be used in industrial and raw materials processing, greatly increasing the efficiency involved. There is enough fusion fuel, physicists estimate, to provide the world with increasing amounts of energy for billions of years.

Rep. McCormack has called the potential for an Apollo-style fusion program "the single most important energy event in the history of mankind. Once we develop fusion we will be in a position to produce enough energy for all time, for all mankind. This is not hyperbole, but fact."

Despite the almost total lack of press coverage, the exception being a small UPI feature in the Aug. 26 *New York Times,* the bills have been hailed by fusion scientists like Dr. Robert Hirsch, former U.S. fusion head who advised Rep. McCormack's Energy Research and Production Subcommittee of the House Committee on Science and Technology in the formulation of his bill. The DOE's special Fusion Advisory Board, headed by Dr. Solomon Buchsbaum of Bell Laboratories and including top scientists, called for concerted efforts to develop fusion by the year 2000. McCormack's bill was also endorsed by Dr. Stephen Dean, former director of magnetic confinement for the DOE fusion office and president of the industry group Fusion Power Associates, who declared the bill "long overdue."

The FEF role

One of the biggest supporters of the rapid development of fusion energy as America's energy source for the future has been the New York-based Fusion Energy Foundation, a nonprofit scientific foundation. Commenting on the bill, the foundation's executive director, Dr. Morris Levitt, said that "only a cheap and virtually unlimited energy source like fusion can put the United States back on the road to economic prosperity and revive our position as a scientific world leader."

Whatever bill comes out of the House-Senate conference after the two bills are passed, the main question is whether the President will sign the fusion bill. Although Jimmy Carter had expressed his general support for fusion in a reply to a letter to Rep. McCormack, the administration has indicated that it is unwilling to support the aggressive upgrading of the program outlined in the McCormack bill. The President might be hard pressed not to sign the bill, however, because of the support for fusion in the Democratic Party's 1980 platform. The platform reads: "The Democratic Party vigorously supports substantial funding for the construction of an engineering test facility for fusion technology. Fusion is a safe, clean, alternative source of energy which can be used to generate electricity efficiently."

The consensus on Capitol Hill is that the President will sign the bill, giving the green light to hopes for a revival of the U.S. as a world industrial and scientific leader.

The response to the McCormack victory

Sen. Jesse Helms (R-N.C.) placed in the Sept. 3 Congressional Record *a speech by John Hicks, vice-president of Duke Power Co., before the Southeast Synod of the Presbyterian Church. The speech demands that the United States rapidly expand its nuclear energy capability. Excerpts follow.*

The United States must play a leadership role in solving the problem of world hunger and upgrading the living standards of the emerging nations. We cannot do this without an adequate energy supply.
as a church should squarely and publicly recognize the

role that coal and nuclear power must play in our immediate future and urge our elected officials to get on with assisting rather than delaying badly needed development. . . .

Not as a utility executive, but as a Christian, I approach it from an entirely different angle. . . . I approach the subject by first looking at world population and world hunger. Then I move to a consideration of food production and its relationship to energy availability.

One man tilling the soil with his own labor can raise enough food to feed his family with a small surplus to barter. The solution in times past for such cultures was to have more children work.

One man with a beast can feed his family, the beast and two and one-half more families.

But one man with . . . a tractor can pay for and operate the tractor and feed 40 more families.

There are some 4 billion people on this earth. It is estimated that one-fourth to one-third of them are hungry. And I have heard an estimate that approximately 30 million people die each year from starvation and malnutrition-related deaths. . . .

I cannot say what all this says to you, but I can tell you what it says to me. . . . It says that we have a great nation . . . made up of basically good and caring people. It also says that if we are to do what I believe God has called on us to do . . . to improve the conditions of mankind, we must produce tractors and . . . operate them.

This will require vast quantities of energy. Oil must be saved to operate the tractors and to manufacture the huge supply of fertilizer that will be needed. The energy to run the countless factories that will produce the components for the tractors must come from electricity and that electricity must come from coal and nuclear fuel. . . .

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Here is a sampling of comments by distinguished scientists and political figures on the passage of the McCormack bill.

Edward Frieman, director, Office of Energy Research, Department of Energy: The major thrust is that magnetic fusion is ready to move into the engineering development phase and out of the research phase. Everyone is in agreement with this. It is the overall view that the fusion program is ready to move in a major way. Changes in circumstances in fusion research are changing the administration's view of this.

John Emmett, director, Lawrence Livermore Laser Program: It's terrific. It's a truly great moment for the United States in both the magnetic and inertial fusion programs.

Dr. Stephen O. Dean, president, Fusion Power Associates: The passage of the McCormack bill along with the endorsement of the Buchsbaum report are clear signs that Congress and the administration will come out with more aggressive fusion programs next year. We should support getting all parts of the policies needed for an accelerated program done as soon as possible.

Rep. Jim Wright (D-Tex.), Majority Leader, U.S. House of Representatives: This particular piece of legislation may be one of the most fearfully significant decisions that we shall make in this Congress or in this decade. We are here committing ourselves to a Manhattan-type project, accepting the rightful priority of the potential of nuclear fusion as a primary goal of the United States. . . . There have always been at each step up the path of man's increasing physical knowledge those who have balked and dragged their feet. . . . When aviation was in its infancy, some insisted that if God had intended man to fly, He would have endowed us with wings. . . .

Rep. Don Fuqua (D-Fla.), chairman, House Science and Technology Committee: There is a need to revitalize our technology industries. There is a need for development of inexhaustible energy resources. And there is a need to maintain the United States in the number one international position in fusion energy research and development. . . . The Soviets have over twice as many scientists working on the development of fusion power. The Japanese are spending 50 percent more per capita on fusion than the United States. . . .

Rep. Edwin Forsyth (R-N.J.): The pace of fusion research and development is clearly limited by funds. The ingenuity, skills, and knowledge exist for the construction of a fusion test facility. What is lacking is funding and a nationally recognized commitment, like that of the space program of the 1960s that will mobilize our resources so that we may reap the benefits.

Rep. Robert Young (D-Mo.): One of the important aspects of this bill is that is provides for the industry participation which has been so crucial to our past successes. The NASA program demonstrated the enormous long and short term benefits we all receive from government-industry partnerships in high-technology ventures. We have seen major advances in diverse fields from miniaturization of computer components and aids to marine safety to improved container coatings and new devices to correct erratic heart action. . . . We expect similar spinoffs from the fusion program

Warren Hamerman, executive director, National Democratic Policy Committee: The fusion bill opens the possibility for the first time in 20 years of a national scientific research and development program that can take the United States into the 21st century assured of the plentiful energy needed for growth. American agriculture, labor unions, and industry should get behind the bill so that we can implement it and get our economy going again. ■