

Nuclear fusion power: ready for a take-off

by Richard Freeman and Charles B. Stevens

If the United States is to have an energy future into and beyond the decade of the 1980s, it must develop nuclear fission and fusion energy at a very rapid pace. This view, frequently expressed in the pages of the *EIR*, is now gaining broader support at a very crucial time. For the issue of nuclear power and fusion research will have a tremendous impact on the current debate on whether the U.S. is capable of reindustrializing, and if so, by what means and at what rate.

On June 23, an impressive policy document appeared when the Department of Energy's Fusion Review Panel released its study on the prospects of fusion power—the process of joining two hydrogen isotopes at fantastically high temperatures, generating even greater amounts of heat and usable energy. The deuterium and tritium fuel employed in fusion reactions is obtainable from common seawater; thus fusion would represent the cheapest, most energy efficient and most abundant—almost limitless—of all existing or future fuel-energy systems. After studying U.S. fusion efforts, currently funded at a paltry \$400 million per year level, the panel determined that the United States “is now ready to embark on the next step toward the goal of achieving fusion power.”

Composed of ten members and chaired by Solomon Buchsbaum, vice-president of Bell Laboratories, the panel made specific recommendations. In its 35-page report, the panel calls for gearing up the DOE's magnetic fusion effort to \$1 billion over the next three to four years to ensure that prototype fusion electric power plants, i.e., demonstration models, will be a reality before the year 2000. From there, fusion becomes a commercial proposition.

In its analysis, the panel reveals that an unprecedented

scientific consensus for a U.S. fusion commitment exists from the university laboratory to the highest levels of responsible government agencies, including the Office of Management and Budget. The Buchsbaum report is bound to add momentum to the legislation for vastly increasing the U.S. fusion commitment vigorously sponsored by Rep. Mike McCormack, a Washington Democrat.

In light of this most recent positive review of the U.S. fusion program, it is possible that Congress may move to take the initiative, if the Carter administration continues to ignore its own scientific experts and leading agencies on the fusion development question.

The timing of the Buchsbaum report is propitious for another reason. Currently, the most important U.S. policy and economic debate in the last twenty years is taking place, around the so-called “Re-Industrialization Debate.” The core of the debate is simple: Can the U.S. achieve a high-technology base adequate to its civilian and military needs? This question assumes an approach that extends beyond recovering from depressions, including the current worsening one, but actually involves looking 20 to 30 years down the road.

Indeed, only an approach that thinks 30 years into the future and then plans shorter 10- and five-year stretches of economic growth by working backward can competently define investment and capital formation strategy. What industries and new technologies, for example, should become dominant and receive major public and private funding to contribute toward a revitalized, revolutionized, and thus highly productive U.S. economy in the future? To compete with Japan, Germany, France or the Soviet Union, the United States cannot



Solomon Buchsbaum, vice president of Ball Laboratories, and chairman of the DOE special review panel for fusion research.

think in terms of copying their best technologies, but of leapfrogging far ahead.

From this perspective, any competent reindustrialization program must minimally include the following crucial high-technology-vectored elements: 1) generating the type of high-technology energy program that features the use and development of controlled high temperature plasma processes; 2) a relaunching, on a vastly expanded basis, of the 1960s National Aeronautics and Space Administration program, to pursue space exploration, and also develop the types of new materials, electronics, and so forth that are the prerequisites for such a space program; and 3) the use of the most advanced telecommunications processes, including such advanced work as fiber-optics.

If, for example, a competent space program is to be launched, and its leading edge of technology captured and generalized throughout U.S. industry, industrialists today must look to the use of advanced ceramics that could enclose future space ships and would be able to withstand the highest temperatures and stresses from hurtling through outer space. This entails certain ceramic materials centimeters thick, but as strong as several-foot-thick blocks of concrete. Such ceramics can soon start to replace basic steel, including structural steel, having not only greater strength but far greater flexibility. This means a major consideration of investment.

In the area of energy development, the United States has to think in terms of replacing oil as an energy source—in 20 years it would be used almost exclusively as a lubricant, feedstock and base for chemical products. Obviously, we must junk the synthetic fuels program that passed Congress this week. This program, which plans

oil share and conventional coal gasification, will consume more energy than it generates. As such, these programs are scientifically inefficient and economically suicidal.

Buchsbaum's recommendations

In its general overview, the Buchsbaum panel reports that, "The Panel is pleased to record its view that the taxpayers are receiving their monies' worth. The [current fusion] program is being well managed, and is conducted by a cadre of dedicated, capable, and hard-working scientists and engineers . . . recent progress in plasma confinement is impressive."

Within the body of the report, the panel observes: "There is confidence, based on the recent progress, that a facility containing a burning plasma, perhaps even an ignited plasma, can be built and operated reliably to serve as an engineering focus and test bed. . ."

In its first specific recommendation, the panel calls for taking this step. "The magnetic fusion program can, and should, embark on the next logical phase toward its goal of achieving economic feasibility of magnetic fusion." Together with a broad-based engineering program, a "Tokamak-based Fusion Engineering Device should be in operation within ten years."

The panel's second recommendation is a "broad-based program in plasma confinement . . . to ascertain the highest potential of magnetic fusion." This, according to the panel, would consist of at least: (a) "the construction of the large tandem-mirror facility (MFTF-B)"; (b) "The DOE should plan and implement a coherent, comprehensive, advanced Tokamak program."

In that context, the report states that "inexpensive high-field Tokamaks (like the MIT Alcator) should be pursued." Strengthening current joint work with Japan was also proposed, and the panel strongly praised the INTOR (International Tokamak Reactor) project initiated by the Soviet Union, which aims to construct a Tokamak-based reactor prototype by the end of the 1980s through international cooperation. Increasing the U.S. Elmo Bumpy Torus hybrid, "which combines many of the attractive features of mirrors and Tokamaks," was also recommended, as was maintaining work on alternate concepts and advanced fusion fuel cycles.

This study, which was commissioned by the current DOE Director of Energy Research, Edward A. Frieman, is actually the second major review of the U.S. fusion effort in the past two years. The first study was completed in 1978 by the Ad Hoc Panel of Experts under the chairmanship of Dr. John Foster of TRW Corporation and also arrived at a favorable conclusion

with respect to the status of fusion, which the Department of Energy ignored.

The spirit and promise of future fusion development has been kept alive especially by Congressman Mike McCormack (D-Wash.), who introduced a bill into Congress Jan. 22 for an Apollo-style program to develop a commercial fusion reactor before the end of the century. The bill, H.R.6308, now has over 150 House sponsors, including most members of the Science and Technology Committee, Majority Leader Jim Wright, and Minority Leader John Rhodes. The bill calls for a \$20 billion investment into the U.S. fusion effort. A companion bill, without funding specifications, was introduced into the U.S. Senate this week by Sen. Tsongas (D-Mass).

It now remains to be seen whether U.S. industry and labor have enough sense to secure the basis for genuine reindustrialization by moving an adequate fusion energy bill through Congress in the next session.

What the bill says

The following is excerpted from HR 6308, The Fusion Energy Research, Development and Demonstration Act of 1980, sponsored by Rep. Mike McCormack (D-Wash.).

Findings and Policy

- (2) the current imbalance between supply and demand for fuels and energy in the United States is likely to grow each year for many years, aggravating an energy crisis and threatening the economic strength and national security of the nation;
- (4) it is the proper and appropriate role of the federal government to undertake research, development, and demonstration programs in fusion energy technologies;
- (6) the early demonstration of the feasibility of using magnetic fusion energy systems for the generation of electricity and the production of heat, hydrogen, and other synthetic fuels will initiate a new era of energy abundance for all mankind forever;
- (9) the early development and export of fusion energy systems, consistent with the established preeminence of the United States in the field of high technology products, will improve the economic posture of the United States, and ultimately reduce the pressures for international strife by providing access to energy abundance for all nations. . . .

The DES hoax

Susan Cohen updates what cattlemen know and consumers ought to learn

On April 1 of this year a disgruntled Texas feedlot employee quit and wrote a letter to the company's Chicago headquarters outlining in detail the feedlot's continued use of diethylstilbestrol (DES) implants. Panicked, the company ran to the Food and Drug Administration (FDA) to confess. DES, a synthetic hormone which acts to increase the rate of weight gain in fed livestock by 17 percent and which improves feed efficiency by 12 percent, was outlawed by the FDA as of July 1979, with all use to cease as of November 1979.

There was no good reason for outlawing the hormone in the first place. It is perfectly safe and very useful. There was no good reason, therefore, unless one approaches the livestock industry from the standpoint of a saboteur, determined to keep meat off the American dinner table. That is apparently the standpoint of certain "environmentalists," the FDA, HEW Secretary Harris, and the Department of Agriculture. They used the disgruntled Texan's report to launch a major disruption of the cattle industry.

An army of FDA agents poured into the field, and within weeks more than 400,000 head of cattle had been quarantined; no one knew how high the numbers would go. Hundreds and thousands of producers have been interrogated, along with their veterinarians, consultants and feed supply dealers, and the witchhunt is not over. By the end of June the FDA's "Violators List" numbered 301 cattlemen from 23 different states. FDA lawyers are operating under the "vigorous prosecution" orders barked out by Health, Education and Welfare Secretary Patricia Harris and U.S. Department of Agriculture Assistant Secretary Carole Tucker Foreman—that means each violator can get up to \$10,000 in fines and three years in prison for each count against them.

Bureau of Veterinary Medicine Director Lester Crawford announced that the cattle industry and the FDA had both failed to protect the American public from cancer. The FDA, said Crawford, had been "flip-pant about carcinogenesis." Crawford promised that between the FDA and the USDA a "better police effort"