

## Energy policy

# Buchsbaum report mandates fusion energy commitment

*The Report of the Fusion Review Panel of the Department of Energy's Energy Research Advisory Board (ERAB), released June 24, evaluates the "impressive" progress of the U.S. magnetic confinement program and recommends that the DOE upgrade the program in order to ensure prototype fusion electric power plants by the year 2000.*

*The Fusion Review Panel is chaired by Dr. Solomon Buchsbaum, vice president of Bell Laboratories, who is also a member of ERAB, and the report is known by his name. Panel members include Dr. Robert Conn, professor, School of Engineering and Applied Science, University of California; Dr. James Fletcher, vice chairman of the Burroughs Corp. and former NASA head; president for science & technology, TRW, Inc.; Fubini, head of E.G. Fubini Consultants, Ltd.; Goldberger, president of the California Institute of Technology; Dr. Roy Gould, chairman of the Division of Engineering and Applied Science, California Institute of Technology; and Dr. Wolfgang Panofsky, director of the Stanford Linear Accelerator Center. Excerpts follow.*

### Introduction

The DOE Magnetic Fusion Program is large: In fiscal year 1980 some \$355 million will be expended; in fiscal year 1981 nearly \$400 million is included in the president's budget. (There is, in addition, some private funding, but this is not more than a few percent of what the government spends.) The panel is pleased to record its view that the taxpayers are receiving their monies' worth. . . .

### Executive summary

Recent progress in plasma confinement justifies confidence that demonstration of scientific feasibility of magnetic fusion, that is, energy breakeven, is near. . . .

However, the state of knowledge is not adequate to determine an optimal configuration of plasma and magnetic field for a working reactor. Nor can we be sure today that a safe, environmentally acceptable, economically attractive fusion reactor can be built and operated.

These conclusions lead the panel to the following recommendations:

(1) *The magnetic fusion program can, and should, embark on the next logical phase toward its goal of achieving economic feasibility of magnetic fusion. To this end a broad program of engineering experimentation and analysis should be undertaken under the aegis of a Center for Fusion Engineering (CFE).*

A key element of the program should be a device containing a burning plasma, and incorporating in its construction those technological features which can serve as a focus for the development of future reactor technology. Some of the objectives of the recently proposed Engineering Test Facility (ETF)—in particular, the level of neutron flux and duty cycle, as well as the role envisioned for the ETF on the road to commercialization of fusion—are inappropriate at this stage of fusion development. Rather, *the program we advocate should center around a more modest, tokamak-based Fusion Engineering Device (FED).* . . .

Today, the panel is optimistic that with progress comparable to that in the past decade, a power unit, not necessarily an economically competitive one, could be built at or shortly after the turn of the century. . . .

(2) *To ascertain the highest potential of magnetic fusion, a broad-based program in plasma confinement should be continued, based on the following new major elements:*

(a) *Following recent experimental results and favorable theoretical projections, the U.S. mirror program should proceed with the construction of the large tandem-mirror facility (MFTF-B) as a proof-of-principle experiment for open confinement systems. Its design should be sufficiently flexible to permit the incorporation of various projected configurations.* . . .

(b) *Assessment of the reactor potential of tokamaks requires deeper understanding of many issues of plasma physics and technology which were not of immediate urgency when the present generation of machines (TFTR included) was being designed and built. Therefore, in addition to the large engineering device discussed earlier, the DOE should implement a coherent, comprehensive advanced tokamak program.* . . .

(c) *Work on the Elmo Bumpy Torus (EBT)—a hybrid configuration which combines many of the attractive features of mirrors and tokamaks—should be strengthened.* . . .

(d) *Work on alternate concepts, that is, plasma and magnetic field configurations other than tokamaks, mirrors, and the EBT, should continue commensurate with new discoveries in physics.* . . .

(e) *The DOE should support a strong research program on fuel cycles . . . other than deuterium-tritium, since reactors based on such cycles would have major advantages* . . . .