Click here for Full Issue of EIR Volume 4, Number 16, April 19, 1977

Top U.S. Scientists Asked Carter For 'Apollo' Fusion Program In February

The following letter from two leading fusion researchers to President Carter, dated Feb. 16, shows that the President was well informed about the potential benefits of fusion energy development prior to the fusion program budget cuts he instituted.

John M. Dawson and Burton D. Fried are both professors of physics at the Center for Plasma Physics and Fusion Engineering at the University of California, Los Angeles. Besides calling for a crash fusion program in their letter, they note many of the most significant developments in fusion up to this point.

Dear President Carter:

We wish to applaud your firmly stated intention to establish a national energy policy, a step which is disastrously overdue, and also your plans to emphasize not only conservation and near term energy options but also research on solar energy and other renewable energy sources. These latter programs, being essentially long term in character, tend to get very short shrift compared with efforts to find short term solutions to our incredibly urgent present problems — but in twenty years the near term problems will be even worse than at present if we have failed to press for the long range solutions in the interim. This letter is motivated by our profound concerns regarding the long term aspects of the U.S. energy program.

With your background in nuclear energy, you undoubtedly know that, aside from solar power, controlled fusion is generally considered to be the most promising solution to the energy problem in the long term due to its essential advantages: the virtually unlimited supply of fuel, the freedom from problems of diversion of nuclear material, the greatly reduced generation of radioactive waste products (or even their elimination, through the use of advanced fuel reactions which produce no neutrons). The major disadvantage of fusion simply arises from the severe technical difficulties which must still be overcome in the basic physics, the sophisticated engineering and the high technology required for an economic reactor — but history shows this is just the kind of challenge to which our society can respond so magnificently, given proper leadership. The past 20 years have seen a steady progress in fusion, with the critical parameters — plasma density, plasma temperature and energy confinement time — all increasing, notwithstanding budget levels which have been unrealist-

Recent Significant Advances In Fusion

1. The achievement, in tokamaks, of kilovolt plasma temperatures and confinement times approaching those required in a thermonuclear reactor and, in particular, the achievement of conditions close to those required to get useful energy out of a driven reactor (wet wood burner).

2. New inventions by the University of Wisconsin fusion reactor group for achieving long life of the first wall of a reactor.

3. Recent ideas developed at MIT for very high density tokamak reactors.

4. Experiments at the Lawrence Livermore Laboratory, which demonstrate the generation of a thermonuclear plasma using neutral beam injection into mirror machines.

5. Studies at Los Alamos which indicate that material end plugging of straight systems may be more effective than anticipated.

6. Recent results, obtained by groups at the University of Wisconsin, UCLA and at TRW, showing that reactors of the multipole type may be feasible, and that it may be possible to burn advanced fuels in such reactors, i.e., fuels which produce very few neutrons and, hence, much less radioactivity than even DT reactors.

7. The development, by the Lawrence Livermore Laboratory, of direct energy converters which may be employed on some thermonuclear devices, and the invention, by a group at the University of Washington, of high efficiency heat engines that could be used with thermonuclear reactors.

8. New studies by Westinghouse and Math Sciences Northwest, which indicate that a Fusion-Fission system, using fusion systems presently on the drawing boards, could make very efficient breeders of fission fuel, probably in ways that avoid many of the dangers associated with conventional breeders, and which are more compatible with present electric utility company programs than the conventional breeder program.

© 1977 EIR News Service Inc. All Rights Reserved. Reproduction in whole or in part without permission strictly prohibited.

ically low in view of the enormous difficulty of the problems and the incalculable benefits which would accrue from their solution. Just in the last few years, there have been a number of advances which we regard as particularly significant, principally as a consequence of recent increases in funding: some of these are listed on the enclosed sheet.

To those scientists, like ourselves, who have devoted our professional efforts to this challenging problem for the past 20 years or more, it is clear that, notwithstanding its great promise, fusion power is unlikely to become a real option for this country if present levels of support are continued. If adequate resources were available, we are certain that fusion could succeed; the difficulty in securing such support may arise simply because, like any long term project, fusion will not come to fruition until most present politicians have left the scene. You alone, are in the position of being able to make a national commitment to this goal, somewhat analogous to President Kennedy's stirring declaration that we would land a man on the moon. Solving the fusion problem is, frankly, much more difficult than the Apollo project, but the benefits to our country, and to all of humanity, are incalculably greater. As you may know, there has been a modest worldwide effort on fusion during the past 20 years, characterized by very close cooperation, on a totally unclassified basis, between many countries, the principal efforts being in the USA and the USSR; in fact, many of the ideas being pursued in the present U.S. program, such as the tokamak, are based directly on research carried out in the USSR during the 1960s, when the Soviet program was much larger than ours. This program has been a model of collaborative international undertakings, and it seems certain that a declaration of fusion as a U.S. national goal, with appropriate support levels, would stimulate enhanced efforts in the USSR, Europe and Japan.

You have adopted goals for your administration which are literally breathtaking — controlling the federal bureaucracy, controlling the arms race, diminishing world tensions. We wish you the best of luck in these undertakings and we hope that, to your achievements in these areas, you will add the great distinction of being the man who launches the fusion program on a course which will lead to success in this century.

Sincerely yours,

John M. Dawson
Professor of Physics and
Director, Center for Plasma Physics and
Fusion Engineering

Burton D. Fried
Professor Physics,
Center for Plasma Physics and
Fusion Engineering

Fast Breeder Reactors — If They're So Dangerous, Why Are The Soviets Building Them?

The Soviet Communist Party paper Pravda *published an article March 27 entitled "Fast Breeder Reactors: It's Time for Serial Production," by O. Kazachkovskii, Director of the Physics-Energy Institute in Obninsk. The following are excerpts from the article:*

Atomic electricity stations are now being successfully developed in many countries. The majority of them, with thermal-neutron reactors, recommend themselves as reliable, safe, economic sources of energy on an industrial scale. However they by no means utilize the atomic fuel in the best way — only 1-2 percent of the uranium is burned up. Reactors of a totally new type — with a chain reaction of fast neutrons — are free from this deficiency. Here practically all the uranium can be used, including that which is presently wasted.

What happens is that in fast breeder reactors uranium is transformed into plutonium, which burns almost completely. Thus two processes are going on in opposite directions — the combustion of the fuel and the generation (expanded reproduction) of new supplies of it. Furthermore, the fast breeder reactors significantly surpass thermal reactors in thermal parameters and, as a consequence, in the coefficient of useful activity. The efficiency of the use of uranium in them rises accordingly.

(Research on fast breeder reactors) began in our country as early as 1949, under the scientific direction of A.I. Leipunskii. Approximately by the beginning of the 60s the necessary research had been done which made it possible to go ahead with the construction of the first electricity reactors. Now considerable experience has been accumulated and valuable data has been gained through experimental-industrial use. Thus in Dmitrovgrad, in the Ul'yanovsk region, the BOR-60 fast breeder reactor has been successfully functioning for eight years now. Since 1973, the biggest fast breeder reactor in the world, the BN-350, has been operating in Shevchenko, on the Mangyshlak Peninsula. It generates heat both for the generation of electricity and for desalination of water. In Beloyarsk in the Urals construction is being completed on an even larger fast breeder power reactor, with an electric capacity of 600 Megawatts.

The results achieved have confirmed the correctness of conceptions underlying the projections for fast breeder reactors, and demonstrated the high degree of reliability of such systems. Essentially the only problem requiring solution for large-scale use has turned out to be