

editorial

Another look at the energy shortage

This month's issue on nuclear energy represents another installment in our continuing efforts to explore ways in which physicists are working to help overcome the energy crisis. We chose to focus this month on *nuclear* energy because the nucleus is the only major source of new energy that is immediately available to help alleviate the shortages we are already beginning to experience. Thanks to the combined efforts of the Atomic Energy Commission and private industry over the last 20 years, nuclear-fission power plants have been developed to the point where we can look to them to assume the main responsibility for generating electricity in the US. By 1985, utility projections indicate that nuclear plants will have become the largest source of commercial electricity.

However, some questions about the operation of nuclear plants must be resolved in the meantime before these plants can be pressed into service on such a large scale. In this issue, we examine three such problems: providing the technology and facilities for separating enriched uranium (page 23); providing assurances that power reactors can be safely designed against malfunction (page 30); and providing acceptable measures for the safe storage of radioactive wastes (page 36).

Physicists have already made important contributions in these areas and can be expected to continue making them in the future. The same observation holds for the fourth topic in nuclear energy explored in this issue—the possibilities of laser-induced fusion (page 46)—as well as other energy topics we have previously covered (solar energy, magnetically contained fusion, breeder reactors and so forth).

However, nuclear energy cannot offer a complete solution to the national energy problem (or at least not until the time unlimited energy can be generated from fusion). Nuclear energy is useful only as a source for generating electric power. But at present, over three-fourths of the total energy consumed is non-electrical in which gas, petroleum or coal are burned directly in industrial processes, transportation vehicles, residence heating, etc. Government estimates, taking into account the scheduled expansion of nuclear energy and even some supplies of solar and geothermal energy, indicate that the total annual domestic energy supply will fall at least 20% below the minimum expected demand, starting in 1977 and continuing until the end of the century. This minimum deficit

of 20% is the equivalent of 10 million barrels of oil per day and would cost us roughly \$20 billion a year to import.

Obviously there are three paths we can follow in working to overcome this intolerable gap. We can educate industry and the public to use less energy; we can develop more efficient machinery and appliances (for example, only 25% of the energy consumed in transportation ends up as useful work); we can try to find and develop new sources of energy. It is just as obvious that in our present crisis we will have to pursue all three avenues simultaneously.

Fortunately we are already in the process of organizing our efforts as a nation so that they can be focused on these goals. There is the recent creation of the Energy Policy Office in the White House to be headed by John Love, governor of Colorado, who will also serve as Assistant to the President for Energy. We can hope that Congress will take constructive action on the Administration's proposals to establish a Department of Energy and Natural Resources as well as a new agency to carry out research and development in energy. Centralized organizations such as these are needed to gather together the energy-oriented activities now dispersed among hundreds of government offices and press forward with a unified program.

We can expect that physicists will continue to make valuable contributions to the work of any new agencies either in directly affiliated positions or through independent studies. A propos the question of how physicists can help, we are pleased to note that the American Physical Society has recently established a planning committee on energy studies (see page 65). The new committee is meeting this summer to begin to draw up recommendations on the ways the physics community can best contribute to helping solve the energy problem. We are looking forward to reporting the committee's conclusions to you as soon as they become available.

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