energy

Information, ideas and opinions debated during a National Academy of Sciences forum on energy last week in Washington.

This is the "year of judgment" that will recast the future value of the world's natural resources, University of Virginia professor S. Fred Singer told listeners at the Academy forum. This theme of urgency was often repeated throughout two days of spirited debate, as scientists, engineers, economists and environmentalists tried to assess the present seriousness of the energy crisis, its potential for creating even more havoc and what approaches to take in solving the problem.

There seemed to be general agreement that the United States could, at least in theory, become self-sufficient in energy, but many speakers expressed doubts about whether the declared aim of President Nixon's "Project Independence" was really a good idea. Cutting the nation off entirely from imported fuel would not only risk similar economic retaliation but also be unnecessarily costly. Oil prices must come back down, economist Richard J. Gonzalez said, hence a better approach than protectionism would be to open new domestic reserves to protect the country against blackmail, and to buy cheaper foreign fuel when available.

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On close examination, many of the projections of future demand and cost of fuel were found to be somewhat inflated. John C. Fisher of the General Electric Co. criticized the prediction that American energy use will keep growing at four percent per year. Such projections, he said, are based on extrapolations from data taken over only a few recent years. In fact, it has taken 120 years for per capita energy use to double, he said. He showed a curve of per capita energy use that was relatively flat except for two surges of growth: one around 1910, representing, he said, the rapid rise of industrialization, and the other, during the present time, indicating a rapid rise of employment among women. Since three-fourths of energy consumed is job related, he concludes, the curve will again level off to very little per capita growth of energy use once full employment is reached.

Though total energy use increases with time, because of population growth, technology has essentially allowed each individual to use his allotment of energy many times more efficiently than his grandfather could. During the mid-19th century, for instance, the chief fuel was wood, which was so plentiful that one French visitor remarked that every American "peasant" could afford one luxury no prince in Europe had—a roaring fireplace all day long.

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Failure to take this inefficient use of fuel into account also affects the validity of predictions of the world's future energy requirements. Comparison of American and Indian energy consumption, for example, is usually based on centralized energy distribution systems, which totally ignores the principal, extremely inefficient fuel most common in rural India—dried chips of cow dung. Technological advancement of developing countries may thus not imply nearly as much additional use of energy as some futurologists have predicted. Moreover, many underdeveloped countries lie in the tropics and will be able to use solar energy rather than fossil fuels as they industrialize.

Over the short-term, however, underdeveloped countries may bear the brunt of the present crisis. The "green revolution" is very petroleum-dependent: Inbred, high-yield crops need fertilizer, pesticides and mechanization, all of which are adversely affected by the fuel shortage, and various speakers warned of the danger of widespread famine in the near future.

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The final anomaly cited during the re-examination of current assumptions about the energy crisis was the lack of any firm basis for determining fuel prices. Oil that costs 13 cents a barrel to produce in the Middle East is now selling for between $11 and $17 on the world market, maintained only by external political forces. Several speakers tried to assess what the oil is "really" worth, and suggested that when international blackmail is no longer as viable, oil prices may sink to these more realistic levels.

James Tobin, the Sterling Professor of Economics at Yale, told of the work of a young colleague who set about trying to estimate the fair value of oil considering its limited supply. Assuming that other primary sources of energy (such as fusion) are developed, but that some petroleum will be needed for lubrication and petrochemicals for at least a couple of centuries, he estimated oil's present "worth" at $1.20 a barrel.

Other speakers estimated how much it would cost to replace oil, either through synthetic production from coal or through recovery from presently untapped sources such as shale and tar sands. In theory, oil from the Middle East cannot be maintained at a price above what it would cost to develop these previously unprofitable resources, and on this basis, the "replacement value" of the world's petroleum lies between $5 and $9 a barrel, depending on which alternative is chosen and how long it takes to develop.

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Not surprisingly, the main conclusion of most of the speakers was that the best way to face the current crisis is to encourage more research and development in energy-related areas. New technology is the key to solving the energy shortage, according to Chauncey Starr, president of the Electric Power Research Institute, and also is the answer to the related environmental and basic raw materials problems. R & D effort, he said, must be focused on finding new sources of power and, at the same time, on making energy use even more efficient. The minerals shortage can ultimately be met only through more sophisticated recycling of limited resources. The environmental movement, he said, must essentially wait for new ways of removing sulfur from dirty fuels, cleaner methods of power generation and new techniques for using that power efficiently.

In turn, however, these developments must await resolution of what Amherst economist James R. Nelson called the most serious shortage of all—the shortage of capital. While the "stately fox-trot" of the regulatory process tries to catch up with events, and oil companies act like a "bunch of Dr. Jekylls hiding," technological progress is slowed for lack of funds. Only quick Government intervention, in the form of new regulations and new money for research and development, can break the logjam, he concluded.

One of the co-chairmen of the Academy forum, MIT physicist Philip Morrison, praised the idea of the forum. Too often, he said at a final press conference, the Academy takes some "cozy position" on controversial issues, but debates such as the energy forum help bring this group of "self-appointed elite, who take a fictionalized view of the world" into closer contact with reality.