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Mr. Chairman, I am pleased to appear before this Committee to discuss the development of a synthetic fuel industry in the United States. In my remarks, I will address several major issues:

- o The benefits and costs of developing a domestic capacity to produce synthetic fuels;
- o The alternative goals for a synthetic fuel program—information versus oil import reductions; and
- o The advantages and disadvantages of alternative financing mechanisms to stimulate synthetic fuel production.

Benefits and Costs

Benefits. The two major benefits attributable to synthetic fuel production are those of any program intended to reduce oil imports. First, it would provide protection against future shortages or interruptions in the supply of oil. As both the current and the 1973-1974 experience indicate, oil shortages have a negative effect on the economy and, in extreme cases, could even affect national security. Second, synthetic fuel production might reduce the rate of future OPEC price increases. This would improve the U.S. balance-of-payments position and would provide some relief from inflationary pressures. In addition, a unique advantage of synthetic fuel

production is that it would provide information about the feasibility and costs of alternative technologies which would be helpful in designing our long-term transition to alternative energy resources.

Costs. Synthetic fuel production would involve two potential costs. First, it would likely cause additional environmental degradation, especially from intensive surface mining. Second, synthetic fuels would probably be more expensive than conventional fuels, at least in the intermediate term, and thus they would probably entail either higher consumer prices or government subsidies. It must be stressed, however, that there is great uncertainty about the future price of both synthetic fuels and conventional oil. The price of conventional oil is determined largely by a cartel and reflects political as well as economic factors. The price of synfuels would depend on scale economies, environmental and technological unknowns, and the effects of future inflation on the construction of large plants. Consequently, if a synthetic fuel program is developed, it should be viewed as insurance against future supply shortages and OPEC price increases, and not necessarily as an economically efficient investment.

Appropriate Goals for Synthetic Fuel Production

Most of the synthetic fuel bills that are under active consideration by the Congress have production goals between 500,000 and 5 million barrels of

oil equivalent per day by 1985 or 1990. The appropriate production goal depends upon whether the program objective is to develop an information base for evaluating potential alternative technologies and resources or to reduce oil imports significantly.

Information Goal. A certain production threshold is necessary to develop the critical technical, environmental, and economic information needed to choose the most efficient technologies and resources that should be developed over the long run. Although this threshold is difficult to estimate, it most probably falls between 200,000 and 400,000 barrels of oil equivalent per day. This represents four to eight commercial-size plants of alternative technologies and resources. A strong case can be made to set a program at this level on the grounds that the United States will eventually have to change to alternative fuels and that such a base of knowledge will help in choosing those resources and technologies that will allow an efficient transition.

Oil Import Reduction Goal. Whether or not the production goal for synthetic fuels should be set above the information threshold of 200,000-400,000 barrels per day depends on two factors: first, how additional synfuel production compares with alternative programs in terms of oil import reductions per dollar; and second, the overall oil import level that

the United States considers acceptable in terms of economic and national security risks.

Assuming oil price decontrol and a continuation of current policy, oil imports will be approximately 12 million barrels per day by 1990. If the United States wants to lower this dependence by about 4 million barrels per day to approximately 8 million, there are a number of alternative programs that rank higher than additional synthetic fuel production in terms of oil import savings per dollar. These include an aggressive residential and even commercial insulation program, accelerated retirement of oil and gas boilers in both utilities and industry, production of unconventional gas and heavy oils, and expanded solar hot water and space heating and cooling. For example, approximately 21 million housing units still have substandard insulation. If such dwellings could be made more energy-efficient, even through direct federal grants, savings of at least 400,000 barrels per day would be possible just in the residential sector alone.

The industrial sector currently consumes nearly four million barrels per day of oil and gas equivalent, half in steam boilers. Since solid coal is nearly cost competitive with oil and natural gas for most boilers, tax incentives or direct subsidies on the order of \$5 per barrel could accelerate the replacement of oil and gas boilers with coal for a potential oil import saving of 500,000 barrels per day. Similar incentives for the replacement of

nonboiler oil and gas use with coal could bring the total potential saving in the industrial sector close to 800,000 barrels per day by 1990. In the utilities industry, accelerated replacement of oil and gas boilers with coal could add almost 1 million barrels per day in potential oil and gas savings by 1990 through a similar tax incentive or subsidy of about \$5 per barrel. Together with a 200,000-400,000 barrels per day synthetic fuel program and additional incentives for solar energy in residential and commercial use, commercial insulation programs, and unconventional gas and heavy oils, these programs could provide close to 4 million barrels per day of oil import reductions that appear more cost-effective than additional synthetic fuel production.

If the United States wants to reduce oil imports below 8 million barrels per day as the President has recently announced, then additional synthetic fuel production would begin to become cost-effective on a per dollar basis. Whether or not the import goal should be lower than 8 million depends on the economic and national security risks that the nation would run with a dependence of that level relative to the eventual cost of synthetic fuel production. Even if synthetic fuel production substantially above the information threshold of 200,000-400,000 barrels per day is required to reduce our total import dependence, there would be advantages in a two-stage program--first, a modest program of four to eight commercial-scale plants designed to generate information and then, in three to

five years, a more ambitious production-oriented program. Information on cost, technology, and environmental problems would undoubtedly become available throughout the design and early construction stages of the plants--information that would be very helpful in developing the larger production program. Reducing those unknowns would reduce the risks to both the private sector and the government in initiating such a program.

The Advantages and Disadvantages of Alternative Financing Mechanisms

The private sector has not yet been willing to invest the approximately \$2 billion necessary to build a synfuel plant of sufficient size to take advantage of the economies of scale common to such processes. The various risks are just too high. First, while it is almost certain that synthetic fuels can be produced, specific processes have not been demonstrated on a sufficiently large scale to offer businessmen the level of certainty that they traditionally desire regarding cost and technology. Second, regulatory uncertainties complicate both the cost and technological problems. For example, synfuel plants quite commonly require 25,000 tons of coal per day for feedstock; consequently, a change in surface mining regulations or in Interstate Commerce Commission transportation rates could create havoc with the financial viability of a synthetic fuel project. Finally, it is possible that future world oil prices will not increase as rapidly as they have in the

last few years or that they may, in fact, fall in real terms, thus increasing the relative cost of synfuels.

In developing a synfuels program, the federal government should choose the financing mechanism that would allow the government to absorb the risk that future OPEC prices will not increase as fast as expected or even decrease in real terms. Since the nation as a whole benefits from lower OPEC prices, the government should be willing to absorb that risk. On the other hand, the technological and cost risks should be absorbed by the private sector, which traditionally accepts these risks in making investment decisions. Such a separation of risks would maintain the incentives within the private sector to construct and operate synthetic fuel plants efficiently. In addition to the goal of efficiency, the financing mechanism chosen should have a predictable impact on the budget and should be considered in the normal budget process.

The financing mechanisms available to the federal government include loans, loan guarantees, purchase agreements, and actual government construction of the plants.

Given the size of the investment required for these plants, as well as the overall risk, it is very doubtful that federal government loans, even at subsidized rates, would provide sufficient stimulus for the private sector to

construct the plants. Alternatively, if the federal government itself were to build these plants, it would then absorb all the risks--that is, the technological and cost risks, as well as the risk associated with any future changes in OPEC prices. This would give contractors less incentive to build the most cost-effective plants, since no private sector money would be at risk. Overall efficiency would, therefore, be reduced.

Similarly, loan guarantees would shift much of the cost and technological risk of building plants from the private sector to the government and thus reduce the incentives for efficiency. From a budgetary standpoint, loan guarantees for large-scale projects are undesirable since they tend to obligate the federal government to a potential future outlay (from a default) that is considerably above the initial appropriation. Furthermore, the unpredictable nature of loan guarantees for large projects also makes their inclusion in the budget resolution difficult. Loan guarantees are more appropriately used for programs such as housing, in which the risk is spread over a large number of small projects, and the default rates can be predicted with a reasonable degree of accuracy.

Purchase agreements, whereby the federal government contracts to buy a given amount of synthetic fuel production, have a distinct advantage over alternative funding mechanisms in that the private sector absorbs the

technological and cost risk and, therefore, maintains a strong incentive to build cost-effective plants. The federal government, on the other hand, absorbs the risk that OPEC prices will fall in real terms or not increase as fast as expected. From a budgetary standpoint, purchase agreements also have the advantage of being included in the budget resolutions, and the outlays are more predictable over time since at least the maximum cost is known.

Conclusion

In conclusion, Mr. Chairman, a number of benefits—such as economic and defense security and possibly lower future OPEC prices—would result from synthetic fuel production; most of these benefits, however, would be similar to those flowing from any federal program that reduces oil imports. The unique benefit of a synfuels program is that it would develop a critical information base to assist in the eventual conversion to alternative fuels. Synfuels programs producing more barrels per day than this information threshold, however, should be implemented only if the United States wishes to reduce its 1990 import levels below about 8 million barrels per day, since several alternatives are likely to be more cost-effective than synfuels in reducing oil imports to about that level. Even assuming that higher

production is needed, program efficiency might be increased if a two-stage program were initiated--an initial information program of 200,000-400,000 barrels per day followed by a high production program during the next several years, after additional knowledge about costs, technology, and environmental problems is attained. Finally, with respect to financing mechanisms, purchase agreements appear to be more desirable than loans, loan guarantees, or direct government construction in stimulating an efficient synfuels industry.

Mr. Chairman, I would be happy to answer any questions.

