

SYNTHETIC FUEL PRODUCTION

HEARING
BEFORE THE
SUBCOMMITTEE ON ECONOMIC STABILIZATION
OF THE
COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE
NINETY-SIXTH CONGRESS

FIRST SESSION

TO STUDY VARIOUS PROPOSALS DESIGNED TO REDUCE OR
ELIMINATE OUR DEPENDENCE ON FOREIGN SOURCES OF
ENERGY THROUGH THE DEVELOPMENT OF SYNTHETIC FUELS

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WEDNESDAY, JUNE 20, 1979

U.S. SENATE,
COMMITTEE ON BANKING,
HOUSING AND URBAN AFFAIRS,
SUBCOMMITTEE ON ECONOMIC STABILIZATION,
Washington, D.C.

The subcommittee met at 10 a.m., in room 5302 of the Dirksen Senate Office Building, Senator Donald W. Riegle, Jr. (chairman of the subcommittee) presiding.

Present: Senators Riegle, Proxmire, and Lugar.

OPENING STATEMENT OF SENATOR RIEGLE

Senator RIEGLE. The Subcommittee on Economic Stabilization will come to order. Senator Proxmire is chairman of the full committee. There is a motion on the Senate floor and he will be over here shortly. But I think we ought to begin.

Today's hearing is both a continuation and a beginning. It is a continuation of a series of hearings that this subcommittee has been holding to study the economic impact of the petroleum shortage, and it also marks the beginning of our determination to move from a diagnostic phase to a phase of action designed to bring about a resolution to what is quickly becoming the Nation's single most pressing strategic and economic problem.

ECONOMIC UNCERTAINTY

Our purpose today is to study various proposals designed to reduce or eliminate our dependence on foreign sources of energy through the development of synthetic fuels. Reduced dependence on foreign supplies is of vital importance to the Nation and its economy. As confirmed in our earlier hearings, the current petroleum shortage is a reality and is very likely to remain so in the absence of major national policy initiatives. We have also learned that the average quality of the crude oil available to us is deteriorating. This, in conjunction with rising demand, is placing strains on existing refinery capacity, particularly the kind of capacity that produces light product such as gasoline. Meanwhile, far too little new refinery capacity is under construction and most of that is of the wrong kind. The decision, just announced by Saudi Arabia, to increase crude oil production to 9.5 million barrels per day is welcome, but it merely underscores the fact that foreign sources of crude oil supplies, even when adequate, are subject to start and stop decisions beyond our control. This adds to economic uncertain-

ty and contributes to the difficulty of rational economic planning both at the private and the public level.

At the subcommittee's hearing of June 6¹ it was demonstrated by expert witnesses that both petroleum price increases and physical shortages inflict exceedingly adverse effects on the domestic economy. They push up the price level. They reduce production and employment. They add to the risk of recession. And they create the likelihood that when recession comes its impact will be worse than otherwise. Finally, dependence on foreign oil adds to the weakness in our balance of payments. The effect is to depress the international value of the dollar thus making imports more expensive and reducing the return from the sale of our exports. The outcome is a drain on our real national income and a reduction in our standard of living.

PROMOTION OF SYNTHETIC FUEL PRODUCTION

In view of these adverse conditions, attention to promotion of synthetic fuel production is most timely. Fortunately, the issue is now receiving much needed congressional and public attention. Under the leadership of Congressman William Moorhead, chairman of the Subcommittee on Economic Stabilization, the House Committee on Banking, Finance and Urban Affairs has favorably reported H.R. 3930, the Defense Production Act Amendments of 1979. This bill contains specific authority for the startup, through a joint Government-private industry effort, of the production of synthetic fuels and synthetic chemical feedstocks for national defense purposes. The bill would add a new section to the Defense Production Act directing the President to attempt to achieve a national production goal of at least 500,000 barrels per day of crude oil equivalent of synthetic fuels and synthetic feedstocks within 5 years of the effective date of the amendments made by the bill.

Supplementing Congressman Moorhead's initiative are a number of plans that have recently been put forward by concerned private citizens. Some of these citizens are our witnesses today. Their plans have in common with the Moorhead bill the characteristic that they propose a partnership between Government and industry that will solve today's energy problem just as similar partnerships supplied synthetic rubber during World War II and built the aluminum and steel capacity that enabled us to prosecute the war successfully.

Our witnesses today are two Washington attorneys, Mr. Lloyd N. Cutler and Mr. Eugene M. Zuckert; Mr. Paul Ignatius, president and chief executive officer of the Air Transport Association; and Mr. Felix G. Rohatyn, senior partner of Lazard Freres & Co., and chairman of New York City's Municipal Assistance Corp. Messrs. Cutler, Ignatius, and Zuckert published a description of their plan in the Washington Post of June 10, 1979; and it is my understanding that they will elaborate on that today.

In addition, they have agreed to include in their testimony some comments on the Moorhead bill and how their plan can be reconciled with it. Mr. Rohatyn, the financial savior of New York City,

¹ Gasoline shortages, hearings before the Subcommittee on Economic Stabilization, May 22 and June 6, 1979.

has agreed to join the panel. He has also been deeply involved and will present his own views and proposals.

I also hope that he'll react with the other gentlemen on what they're presenting today. It seems to me essential to consider how we might best proceed to try to fly through the whole conversion of this thing, the size and scale, and also, what time frame we ought to be thinking about in forcing the development of this national capacity.

If Mr. Rohatyn does as much for us in national energy solvency as he's done for New York City, we'll be very grateful indeed.

We're delighted to have such a distinguished panel today discussing this serious issue. Again, we appreciate your coming. Why don't the three of you who are operating as a team, go ahead and identify yourselves and make the presentation that you have for us?

OPENING STATEMENT OF SENATOR PROXMIRE

Senator PROXMIRE. Before you do that, I have a short statement to make. From recent discussion in Congress and the press, you would think that synthetic fuels are the pot of gold at the end of the rainbow—that they are America's path to energy independence and the sure way to end the lines at the gasoline pump. A kind of magic wand that with little or no pain can let us solve our energy problems—without much difficulty.

Synthetic fuels advocates argue that all of this can be achieved at what they consider a very reasonable cost—no more than \$200 billion for the initial Government and Government-guaranteed investment plus the untold cost of Government purchase commitments and sales subsidies. These advocates also argue that synfuel technologies are proven. They cite the examples of Nazi Germany, which refined some fuel from coal 35 years ago, and of South Africa, which has operated a small synfuel plant for some years.

Finally, synfuel supporters argue that a synthetic fuels program could be modeled after previous Government efforts to develop new technologies rapidly and on a massive scale. They cite the synthetic rubber program during World War II, the Manhattan project, and expansion of several mineral industries during World War II and the Korean war. And yet, they fail to recognize that World War II was a far different situation. We had no alternatives to developing synthetic rubber and expanding critical materials industries. Nor were we as concerned about the implications for the Federal budget. Today, we have numerous alternatives to synthetic fuels and we are very concerned about reducing Federal spending and borrowing. The wartime analogy does not fit.

SYNTHETIC FUEL PROGRAM COMPARED TO SST

However, another analogy does. The prospects for a Government-sponsored synthetic fuels industry remind me of another Government subsidy program of more recent years. I refer to the poorly conceived and enormously wasteful SST program of the late 1960's and early 1970's. America, it was argued, urgently needed the SST. Otherwise, we would lose our technological edge in a critical industry and would suffer a substantial balance-of-payments loss. Envi-

ronmental and economic objections were sluffed aside by those who recognized the apparent advantages of this project. And yet, despite all these advantages, private capital would not finance the program. Private industry recognized a losing proposition. Fortunately, Congress did also when it canceled SST subsidies.

We should take warning from the SST debacle. Private industry unwillingness to sponsor synthetic fuel plants on its own should tell us something. If synthetic fuel technology were commercially feasible, private industry would be investing its own capital.

Current synthetic fuels projects are plagued by technological and environmental problems which impede economical operations. Moreover, there is no proof that it is possible, even with unlimited funds, to develop a synfuel industry large enough to make a significant contribution to our energy needs.

Cost considerations are blithely minimized. \$200 billion is an enormous amount of money. Where is it going to come from? What defense and social programs are going to be cut back or eliminated? And how much will the budget deficit increase? What will the anticipated level of Government borrowing do to capital markets and the rampant inflation we are currently suffering?

It is argued that the cost is justified because a large synthetic fuels industry would protect us against further OPEC price increases. What happens if it has the opposite effect? What happens if OPEC raises its prices when it sees our willingness to subsidize synthetic fuel production at a cost higher than what they charge? And what happens if the costs of coal and synfuel production continue to rise with the price of oil as they have in the past? Do we gain or lose? It seems to me that a large commitment to synthetic fuels rather than other, more economical energy sources could aggravate the energy cost-spiral.

Furthermore, conservation is painful and certainly no magic wand and it will take years and lots of patience on the part of the American people and a great deal of leadership here in Washington. But, it may be the surest way to meet our energy problems and at the same time, ease the inflationary pressures that obviously are aggravated by rising fuel costs.

UNLIMITED GOVERNMENT SUBSIDIES JUSTIFIED?

I agree that synfuel production has great appeal. However, many questions have not been answered, and many problems have not been considered. Significant cost, technological, and environmental concerns must be addressed. Further research into these questions is clearly justified, but is a crash program with unlimited Government subsidies and reallocation of capital justified given the magnitude of these unanswered questions?

I hope that today's witnesses will be able to address some of these questions. Although we will only hear from synthetic fuels proponents today, we will have a chance to hear a more exhaustive discussion of this issue in late July when the full committee holds hearings on all of the energy legislation currently before it as well as the Moorhead bill which will soon be considered by the House.

Thank you, Mr. Chairman.

Senator RIEGLE. Thank you, Mr. Chairman, and certainly a number of those questions that you have put are important ones that I trust our witnesses will answer today.

Senator Lugar, I gather, does not—

Senator LUGAR. Let me make a quick comment. I don't have a prepared statement, Mr. Chairman, but I simply join, I think a growing number of Americans, who feel that synthetic fuel production must be accelerated and accelerated as rapidly as possible. That the Federal Government try to initiate this. And I welcome these hearings this morning to highlight this necessity.

It seems to me to be intolerable that we are in a situation such as we are in, with no options, at least in the petroleum area, that look very viable for the time being. The synthetic situation, it seems to me, is crucial.

Thank you.

Senator RIEGLE. Gentlemen, why don't you proceed with your presentation and then we'd like to hear from Mr. Rohatyn.

STATEMENTS OF LLOYD N. CUTLER, ESQ., WILMER, CUTLER & PICKERING; PAUL R. IGNATIUS, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AIR TRANSPORT ASSOCIATION; AND EUGENE M. ZUCKERT, ESQ., ZUCKERT, SCOUTT & RASENBERGER

Mr. CUTLER. Thank you very much. Mr. Chairman, my name is Lloyd Cutler, and I will make some preliminary remarks and then Mr. Paul Ignatius, sitting to my right, will present a brief summary of the proposal that you referred to.

I'd like to say first, to Senator Proxmire, that when our mutual friend, Najeeb Halaby was the FAA administrator, he appointed me to a committee that was to consider what sort of Federal funding, if any, should be provided to the SST. The thought in those days was you would have a Comsat type of venture and I have been a counsel to Comsat. I took the position in that case, if you are going to spend that much money, that there were certainly better things we could do in our aviation system, such as building the wide body airbuses, and we should not build an SST.

PERSUASION OF SYNTHETIC FUEL

So, we are not totally in disagreement about when and where the Government should put its hand to the wheel. I'd also like to say that while the notion of synthetic fuel does have the risk of persuading people they don't have to do all the other painful things that need doing to adjust the world energy shortage that was going to come, whether there was an OPEC or not, we don't mean to suggest for a moment that a synthetic fuel program is a substitute for conservation, that it's a substitute for stimulating further development of oil and gas throughout the world and especially on this continent, or that it's a substitute for the ongoing programs to develop renewable sources of energy.

We need every one of those things, Senator. In our view, we need a synthetic fuels program in addition, and because of the long lead times, we need to get it going before the private market will get it

going on its own, which in due course, would probably happen anyway.

But, we don't have that time, and I'd like to explain the reasons why I don't think we have that time. Before I do, I want to say, since you mentioned, Mr. Chairman, Mr. Zuckert and I are Washington attorneys, we have no client interest in this matter. Mr. Ignatius, who is the chairman of the Air Transport Association, has, if anything, only a customer interest. The airlines he represents are probably the largest single buyers of liquid fuel in the country today. If we have anything to contribute, it's only that we're old enough to remember how we attacked what I consider or we consider, respectfully, Senator Proxmire, to be very similar and no more dangerous and critical problems than this one in the past.

I can't think of a time in the last century when the United States, or what we now refer to as the industrialized democracies throughout the world, have been more vulnerable to an external set of circumstances over which we have virtually no control.

We have gotten into a situation—and it wasn't anybody's doing, it was simply following the market to whatever the cheapest sources were—we have gotten into a situation in which probably one-third of the world's liquid energy comes from the very small area in the Middle East, the Persian Gulf, which is probably politically the most fragile place in the world today.

And the time of political turmoil in that area is probably going to continue for a minimum of 50 years, probably more, as far ahead as we can see.

We are vulnerable not only to the kind of instance like the one that recently happened in Iran, where nobody was thinking of applying pressure to the United States or the industrialized West, but where, in the course of an indigenous local revolution, a very serious body blow was dealt to all of our economies. With only a 2 percent or 3 percent oil shortage in the world, the price has skyrocketed within the last year, more than 50 percent.

If we learned anything from that crisis, it was probably that OPEC, the great cartel, had set the price below the market clearing price of oil when political shocks like that develop. It's virtually a certainty that within the next 10 years, perhaps within the next 3 years, there will be other shocks like that with at least equally serious consequences. All of that oil goes through a few terminals, which if destroyed, could very, very easily take us 2 or 3 years to put back into production again.

We used to—we read all those wonderful spy novels about the madman who gets a hold of a nuclear weapon and blackmails the entire world. It's perfectly possible that a few people could get hold of those terminals and blackmail the world politically, or, that in the course of their own local fights for political power and for national recognition in their own countries, they could destroy facilities which would take us years to rebuild.

The entire world depends on increasing our supplies of energy so that we can continue to maintain the kind of economic growth, not only in the industrialized West, but throughout the underdeveloped world, that's going to permit us to at least have a chance to operate within democratic political structures.

EXCESSIVE DEPENDENCE ON FOREIGN OIL

In a stable, no-growth world or declining-growth world, we don't have a chance, we don't even have a chance to exercise the kinds of political initiatives we wish to exercise around the world. It's critical that we get over this excessive dependence on oil from this very small, very fragile portion of the world over which we have no control—military, political, economic or otherwise.

It's at least as important that we do this as it was to get started on the 50,000 or 100,000 airplane programs just before the beginning of World War II. I don't think any of us can take this situation lightly or say that with conservation and solar energy, some day it's all going to work out all right. We just can't afford to depend on it. It's at least as important as maintaining our strategic nuclear forces that we do whatever we can to resolve this problem.

We had problems like this in World War II. We lost our rubber supply. In the beginning of the Korean war, we didn't have enough aluminum or nickel to build airplanes. We found ways, which the Chairman has referred to, to build that capacity by using the Government as the engine of construction, contracting with private industry to do it, leasing plants to private industry, hiring private industry as managers. And in the Korean war we did something even better. We got private industry to build the plants under market guarantee contracts written by the Government.

The Government took risks which you could readily measure in billions of dollars. But the ultimate cost of those programs to the Government was substantially nil. We think we're in a situation very comparable to that, with due respect to Senator Proxmire, and that once again, forced draft from the Government, organized perhaps in the same corporate form that we used in World War II and in the Korean war, is the way to go about it. And while there will be, of course, substantial diversions from other capital markets, while there are problems of the environment that need consideration, it's an absolutely indispensable element of putting ourselves together, getting off our tails and doing something about the gravest threat to the political and economic and military security of the United States, that we have faced, at least, since the beginning of World War II.

Mr. Ignatius will describe to you the plan that we have put forth. We are not energy experts. But we do remember how the Government organized itself to deal with this sort of a problem in the recent past. We think that method can be readily adapted to this situation.

Senator RIEGLE. Thank you very much.

**PAUL R. IGNATIUS, PRESIDENT AND CHIEF EXECUTIVE
OFFICER, AIR TRANSPORT ASSOCIATION**

Mr. IGNATIUS. Mr. Chairman, we've furnished for you and the members of the committee a statement which is the article that appeared in The Washington Post a couple of weeks ago, and we've also furnished a summary statement, which I will in turn summarize here.

We would request that the full statement be made part of the record.

Senator RIEGLE. Without objection, it will be made a part of the record.

[The joint statement of Messrs. Ignatius, Zuckert, and Cutler follows:]

STATEMENT OF PAUL R. IGNATIUS, EUGENE M. ZUCKERT, AND LLOYD N. CUTLER

Mr. Chairman and members of the committee, the price of imported crude oil has increased by 50 percent this year, and it now appears that the real price of imported oil will double again within the next 10 to 20 years.

We are entering an era of chronic oil shortage, and much of the available supply is subject to sudden and periodic interruption because it is produced in areas of recurring political turmoil.

To cope with these dangers, it is useful, of course, to conserve and to stimulate the discovery and production of additional petroleum supplies. But that is not sufficient. We need to create a substitute for natural petroleum. Because of the long lead times involved, we need to do so at once.

The United States could create additional capacity from synthetics—a vast oil reserve, in effect, that could be called into use to overcome shortages or to hold down the world price of oil if the OPEC cartel is trying to move prices upward. This would give us the leverage we have lacked on oil prices and also insure a less bumpy transition to the distant future of alternative energy sources. In this uncertain world, this is an insurance policy we need to buy—now.

The United States, if it has the will, can create a synthetic oil industry capable of producing 5 million barrels a day—more than 20 percent of our current needs. This can be done within five to ten years from sources such as shale, tar sands, heavy oils, coal, and farm crops.

The synthetic fuels program would draw upon the proven experience of the innovative government-industry programs developed to meet comparable materials shortages in World War II and the Korean War.

Three months after the attack on Pearl Harbor in December 1941, 90 percent of the world's natural rubber facilities came under the enemy's control. By 1945, when World War II ended, 87 percent of the rubber consumed in the United States was synthetic. Nearly all of it came from government-owned plants built during the war with the Reconstruction Finance Corporation financing and operated by private industry.

Other critical materials shortages during World War II, notably in aluminum and steel, were met by additional plant capacity financed by the Defense Plants Corporation and other government agencies and operated by private companies under leases or management contracts.

In the Korean War we also faced serious shortages. This time we developed another method, under which the General Services Administration entered into market guarantee contracts with private industry to build new aluminum, copper and nickel capacity.

Under those agreements, the private firm obtained private financing to build specified facilities, in exchange for 5-year tax amortization certificates and the government's commitment to purchase, at specified prices or prevailing market prices, any part of the output that could not be sold to military or commercial users. Some of these facilities employed known processes with predictable costs (e.g., primary aluminum reduction), but others involved new products (e.g., ferro-nickel) with uncertain costs and marketability.

The long-run cost of these programs to the government was negligible. Most of the government-owned World War II plants were sold to their private operators or others at prices that largely recouped government costs. Under the Korean War market guarantee contracts, the new capacity was privately financed. The government did have to purchase some aluminum and other materials in excess of its own stockpile goals, but these excess inventories were later resold to private buyers or to the original producers at higher prices than the government had paid.

Today, about half the petroleum we use is imported. More than half of our imports and even higher percentages of European and Japanese imports come from the Middle East. Our heavy dependence on these sources makes us highly vulnerable to sudden upward price movements resulting from interruptions to supply or from the actions of OPEC. Moreover, no one can be certain, looking ahead to the next five or ten years, that this oil will continue to flow uninterruptedly to our shores. Political changes, terrorist activities, overt military action and natural disasters could lead to a significant reduction or even a halt of deliveries. Each time one of these contingencies occurs, the stress on the economic and social fabric of the

industrial democracies will be enormous. The risks of not trying to correct the present situation are too great to bear.

The Department of Energy (DOE) is pursuing a broad program to advance technology in a number of energy areas. Promising long-range applications, such as laser fusion, and medium-range applications such as those based on solar technology, are expected to emerge. The substitute fuel program would not replace these DOE research efforts. But it would help greatly to fill the gap in the years before the DOE program can meet a significant portion of our energy requirements.

Our concern is the immediate future, the next five to fifteen years. For this period our present program relies primarily on savings from conservation and the increased output from domestic petroleum resources. The President estimates that the various conservation measures outlined in his April 5, 1979 program, together with new domestic oil production resulting from decontrol, will save from 864,000 to 1,539,000 barrels a day. Since we are using upwards of 20 million barrels a day—about half of it imported—we will still be heavily dependent on foreign oil even if the program produces savings at the high end of the estimate.

Substantial additional supplies can be attained only if we undertake an expedited program to produce synthetic oil from sources and technologies that are already at hand. The production program would be based on today's technology. Through joint government-industry efforts, we would create a synthetic oil industry in much the same way that we created a synthetic rubber industry almost 40 years ago and doubled our non-ferrous metal capacity almost 30 year ago.

ADDING OPTIONS

The technology of synthetic oil is not in an early stage of research and development comparable to the intercontinental ballistic missile in 1950, the moon-landing program at its outset in 1960, or laser fusion today. It is a proven technology. Germany waged World War II on synthetic fuel produced from coal. South Africa has been producing synthetic oil since 1955 and has under construction a much larger production facility. In the United States, a number of studies as well as prototype developments contemplate the eventual production of synthetic oil from coal.

Synthetic crude oil (comparable in its characteristics to import crude oil) can also be produced from oil shale, which is also available in enormous quantities in the United States. There are large deposits of oil shale in Colorado, Utah and Wyoming, although environmental and other problems associated with its use and disposal appear difficult to overcome at present. Fortunately, there are important oil shale resources in Kentucky, Ohio, Indiana, Tennessee, and Alabama that seem to be generally free of the problems with Western shale. The Canadian tar sands can also be converted into fuels with existing technology.

The production program might also include substitute fuels made from farm crops. Fuel mixtures of alcohol made from farm crops and gasoline have satisfactorily powered automobiles and agricultural vehicles and offer the promise of saving worthwhile amounts of gasoline.

Large quantities of petroleum products or substitutes like alcohol could be made with known technology at costs of production still above the present world prices of natural petroleum and its products. But while the future course of world oil prices remains uncertain, the trend will surely be upward in real terms—the only questions are how sharply upward in real terms and how soon.

A standing capacity to produce 5 million barrels daily from substitute sources would be of incalculable value to the United States and the free world—whether or not this capacity is continuously operated. Its existence—in operation or standby—would cushion the potential consequences of future political shocks, such as occurred in Iran this year and may well occur there or in other vital production centers again and again. By adding a significant additional operating or standby source of supply, we would also tend to dampen the inevitable upward trend of oil prices. And it would be an important step in developing the synthetic fuel capacity that will certainly be needed when conventional oil sources run down.

Depending on cost-price relationships, the political stability of the world oil trade and balance-of-payments considerations, the United States and its friends would have several valuable options they do not now enjoy:

1. We could currently market and consume the new output, if necessary, by subsidizing any difference between production costs and market prices, and reduce imports by an equal amount. This might in turn lower world prices for the remaining oil that we must import.

2. We could currently purchase the new output and stockpile it as insurance against future political shocks.

3. Whenever supplies of natural petroleum at prevailing prices are deemed more attractive, we could shut down some or all of the new plants. In the case of those privately built under market guarantee contracts, we would pay the owners a standby fee to cover their loan amortization needs plus a reasonable return on equity, with the right to order them reopened whenever it becomes timely to shift to option 1 or 2.

A NEW CORPORATION

To carry out such a program, the United States should create a Petroleum Reserve Corporation, under the leadership of a proven business executive like John deButts, the recently retired Chairman of AT&T. The Corporation would be authorized to design and execute the program to create up to 5 million new barrels of petroleum and alcohol capacity a day. It would be authorized to issue federally guaranteed bonds. It would have authority to build new plants to be initially owned by the government (financed by its bond issues or perhaps by using part of the proceeds of the proposed windfall profits tax) and operated by private industry under leases or management agreements.

It would also have authority to enter into market guarantee agreements for new plants to be built and owned by private industry, with a government commitment to a) buy any part of the output that is not commercially sold, or b) pay the subsidy needed to make commercial sales, or c) order shutdown and pay a standby fee to cover amortization of debt and a reasonable profit, with the right to order reopening at any later time under option a) or b). The Corporation would analyze the feasibility of achieving its goals by employing various mixes of the sources, technologies and financing options available, and would then design its program and negotiate its contracts to suit.

The Corporation would also be empowered to finance the building of plants in Canada (e.g., for tar sands) and perhaps elsewhere, under firm intergovernmental agreements for making the output available. It could also be authorized to enter into joint ventures with other nations, under which they would participate in the financing risks in exchange for the right to a share of the output. It would also serve as a focal point for helping to identify environmental issues relating to the production program that require prompt resolution by the President.

Estimates used by energy planners suggest that the one-time investment cost might be \$20 billion to \$40 billion for each one million barrels of synthetic capacity—or \$100 billion to \$200 billion for the proposed program. The cost to the taxpayer, however, is likely to be much less, depending on how many of the plants can be privately financed under market guarantee contracts, on the extent that other countries participate in the governmental financing risks, and on whether any government-financed plants ultimately can be sold to private industry.

Recently, the Japanese and the West Germans agreed in principle to participate in a U.S. Government-sponsored substitute fuel venture and to contribute half of its expected \$700 million cost. While the ultimate cost to the taxpayer could be significant, it pales beside that fact that we already incur a trade deficit in the range of \$30 billion a year for each 5 million barrels a day of oil we import, even at the current \$17- to \$20-a-barrel price, which seems likely to increase with every passing year.

Looking at the downside risks of our petroleum future, to invest in a 5 million-barrel-a-day synthetic production program is a worthwhile insurance premium. Once this capacity exists, we could respond more flexibly to any future energy development. If real oil prices stay level or go down, we could place the capacity in standby and this would be our only cost. Or, if we preferred to reduce our oil imports, we could operate the capacity at the additional cost of any required operating subsidies.

If real oil prices continue to go up—which now seems the most likely possibility—the plants would be self-supporting or close to that, and most of our investment would be returned.

ADDITIONAL ADVANTAGES

Apart from what it would do to resolve our present petroleum predicament, the proposed program would have other valuable psychological and economic advantages.

First, it would give us all the psychological lift of “doing something” instead of just doing without. It would employ our managerial, technological, engineering and organizing talents to achieve a productive rather than a restrictive result.

Second, if present expectations of a natural or induced recession by 1980-81 prove correct, the program would stimulate the capital goods and construction markets at the very time when a stimulus would be helpful.

Third, the program would give us a vehicle for acting jointly with other concerned industrial democracies to meet the joint actions of OPEC in a non-confrontational manner that OPEC's members could not oppose and might even support.

The public reception to such a program should be highly favorable. The right time to adopt it is now.

Mr. IGNATIUS. We selected a figure of 5 million barrels a day of synthetic oil to be made from coal, shale, tar sands, and agricultural products. We thought that figure was a significant one because it represents about half of our current imports, and would show a determination to deal with the kinds of problems that Mr. Cutler has already emphasized.

We think whatever the figure is, there should be a specific goal, because we are talking here about an urgent problem where there should be a goal with associated time schedules. We believe that's necessary in this case.

COST DIFFICULT TO ESTIMATE

The cost is very difficult to estimate. We have talked to a number of people, and we get different answers from them. Accordingly, we have bracketed somewhere between \$100 billion and \$200 billion the price tag for a capability to produce 5 million barrels per day.

That amount, however, would be reduced substantially to the extent that other countries participated in the financing of these ventures. Second, to the extent to which private industry involved itself, and whether these plants could be sold to the producing companies, as was the case in the rubber program to a great extent.

Also we believe the corporation that we have in mind is the instrumentality for bringing this program into being. It should have the authority to issue bonds and, if that were the case, the amount of money that would have to be put up by the U.S. taxpayer would also be reduced.

In addition to a specific goal, a program of this kind needs a concentrated effort. Reference has been made already by Senator Proxmire and Mr. Cutler to many other things we need to do—solar energy being a case in point.

In no way are we suggesting that a synthetic fuels program on an urgent basis should displace activities of this kind. There is a large-scale research and development program sponsored by the Department of Energy conducted by a number of private corporations investigating many promising techniques.

Those should go forward. What we are saying, however, is that we believe some of the processes for making synthetic fuels could be taken from a research, development, and demonstration posture and placed in production. And because of the lead times, and because of the threat to our natural petroleum supplies, we think it's essential that this be done.

I am quite certain, Senator Proxmire, that over a period of time the market for these fuels would call forth the private investment, as it normally does.

The concern I have is that I don't believe it will happen in the near-term. I think it will eventually happen. And because I'm concerned, as Mr. Cutler and Mr. Zuckert are, about the threat that we face because of the reliance on unstable sources of supply for natural petroleum, that we get on with a government-sponsored program in order to do more quickly what is likely to happen at a slower pace through private financing.

That's the essence, I think, of why we believe a government-industry cooperative program is necessary. Now the management of this effort is terribly important. We have in mind the establishment of a corporation authorized by the government. It would be headed by an executive of proven abilities. It would be empowered to do a number of things: to issue bonds guaranteed by the U. S. Government; to enter into market guarantee contracts under which new plants would be built, owned and operated by private industry; to finance directly the construction of new plants where appropriate; to finance the construction of plants outside the United States such as, for example, in Canada utilizing tar sands; to enter into joint ventures with other nations; and to carry out other responsibilities.

INTENSIFIED CONSERVATION PROGRAM NEEDED

We've said earlier this is no substitute for other energy approaches, and certainly no substitute for a continued—and I believe intensified—conservation program. We clearly need that, and must have a very effective program. We also need solar. We need some of the other energy applications that rely on long-range opportunities, laser fusion, many years in advance, but one of a number of promising approaches.

And finally, there has to be, as in any kind of program, proper concern for environmental issues. They must be identified. We believe, in addition to identifying those problems, however, there has got to be a judicial and conclusive way of resolving them, particularly if we want to embark on an urgent program to provide the kind of insurance policy that we need.

In summarizing our thoughts, then, we believe a program of this kind is in the national interest, because it would lessen our dependence on foreign sources and would alleviate the impact of a halt in delivery, should that occur. It would dampen the inevitable upward trend of oil prices, because we would have a lever of our own that we think would be helpful in counteracting the otherwise inexorable rise in prices.

We think it would give the country a psychological lift of doing something, instead of just doing without. It would employ our managerial and technological talents to achieve a productive, rather than restrictive, result.

It would stimulate the capital goods in construction markets at a time when such stimulation might or could be helpful. It would certainly provide employment at a number of places where it would be needed, and it would permit the United States to act jointly with other concerned industrial democracies to meet the joint actions of OPEC in a nonconfrontational manner.

For those and other reasons, then, we are pleased to have an opportunity to describe this program and know that this committee will give it very thorough and careful consideration.

Thank you.

STATEMENT OF EUGENE M. ZUCKERT, ESQ., ZUCKERT, SCOUTT & RASENBERGER

Mr. ZUCKERT. Just briefly, Mr. Chairman, I ally myself with the comments of both Mr. Cutler and Mr. Ignatius, and it's I think important to say what this program is not, what we know it not to be, as well as what it is.

We don't regard it as a total solution of the problem. We think it would be wrong if the country got this perception. It's not an easy solution. It's going to take a special kind of organization, and there are lead times involved, long lead times involved, as we know.

We can't recover the lead times that have been lost. Inaction since 1973 to date inevitably cannot be recovered. And the program depends, as we see it, on a psychology resulting from the national recognition of the problem.

If we agree that Mr. Cutler is right in his analysis, that is the psychology that will produce the results that we are talking about.

We've seen it in our own experience. I've seen it in the development of the nuclear submarine, as a member of the Atomic Energy Commission. I've seen it in the intercontinental missile programs in the Air Force. These depended upon a determination that we could and would do something of great difficulty. And the results were better than we could have foreseen. But it is essential there exists a belief that the situation is as serious as Mr. Cutler described.

Thank you.

Senator RIEGLE. I'm going to want to come back and talk about the defense side of this thing, particularly with those of you who have been in the defense business in the past, in terms of that particular strategic variable.

But before I do, I think it's important now that Mr. Rohatyn have a chance to put his notion forward, and in so doing perhaps react to similar points that you raised here, agreements and disagreements.

**STATEMENT OF FELIX G. ROHATYN, SENIOR PARTNER,
LAZARD FRERES & CO.**

Mr. ROHATYN. Senator, thank you very much.

I've appeared in front of this committee in other incarnations. I've been grateful for its patience. I've always been particularly grateful to Senator Proxmire's unfailing good humor and courtesy in listening to what he obviously believes to be my bizarre view on things, I'm afraid.

Senator PROXMIRE. You always won, too.

Mr. ROHATYN. It's going to be another test of your good humor.

I am grateful for the privilege of testifying on a subject which in my judgment presents potentially the greatest threat to our system since World War II, and at the same time with our most exciting industrial opportunity since the turn of the century; namely, our overdependence on foreign sources of energy. Only a major nation-

al effort involving the Federal Government and the private sector, involving new production and conservation, can bring about a solution.

GOVERNMENT-OWNED CORPORATION

The proposal to consider a Government-owned corporation set up along the lines of the Reconstruction Finance Corporation to create additional capacity for synthetics is, in my judgment, worthy of serious support.

I will leave to others the discussion of the kinds and amounts of synthetics, the technologies to be used, et cetera. I am a financial person and will address myself to financial and nontechnical issues involved. Before taking those up, I would like to make a more general point.

More important than any single issue, in my judgment, is the need for a national consensus that an energy crisis indeed exists. I believe the President should appoint a blue-ribbon panel whose membership would be totally credible to develop the facts for the American people. With respect to the synthetic project itself, there are several key policy alternatives to be faced here and I will try to address myself to as many as I can.

One, the activity should be centered in a new, separate, Government-owned corporation, and not in a department of the Federal Government. It will be more visibly accountable, will be able to enlist better management, and can be liquidated after a finite period of time. I believe the corporation's life should be no more than 10 years unless specifically extended by the Congress.

Two, the corporation should have the option of both owning the plants as well as financing private operations. Initially I believe, as a general rule, direct ownership would be the most straightforward. Under that option, the plants should be managed by private companies under management contracts. These should contain incentives for construction cost limitations, operating performance, and early resale to commercial interests. Arrangement should be made to insure accelerated resolution of siting problems, environmental permits, litigation, and work stoppages. Government ownership would provide greater leverage than private ownership in those areas.

The alternative is private ownership with a variety of take-or-pay contract, price guarantees, debt guarantees, total or partial, and many other similar mechanisms.

The corporation should have the flexibility to engage in as many as possible of these arrangements, since it would be unwise in advance to be dogmatic about any singular approach.

Three, the corporation's capital should be \$5 billion, paid by the U.S. Government. The corporation should have borrowing capacity of 10 times its capital, or \$50 billion, for a total financing capacity of \$55 billion. The borrowing should take place either by having the corporation sell its obligations in the public markets, fully guaranteed by the U.S. Government, or by having the Federal Financing bank buy its obligations. I would favor the latter because I believe it would be cheaper and would provide for a more orderly method of financing.

The size of the corporation is obviously a critical element. I believe it has to be large enough to be meaningful and yet not so large as to throw financial markets out of equilibrium. On the assumption of a 5-year construction cycle this would mean financing slightly over \$10 billion per annum of incremental Government financing, which I believe the markets could handle without significantly increased cost.

On the basis of current estimates, this level of investment would result in putting in place capacity for the equivalent of about 1,500,000 barrels per day, or almost 20 percent of present imports. At a price of \$20 per barrel, it would mean a saving of over \$10 billion per annum in our balance-of-payment.

Four, the objective of the corporation should be to sell the plants to commercial interests as soon as practicable and to reinvest the proceeds, if necessary, in the next level of technology. It is therefore altogether possible that, at the end of its 10 years, it will have actually invested over \$100 billion.

FINANCING BY FOREIGN GOVERNMENTS

Five, it would seem desirable, and indeed equitable to me, to suggest that the German, Japanese, and Saudi Arabian Governments, as well as any other governments which wish to join, participate in the financing of the corporation and be assured of a portion of its output. These governments could be asked to acquire \$15 to \$25 billion of the corporation's bonds, over the 5-year period, thereby making them significant partners in the project, possibly equal partners. Their bonds should not be guaranteed by the U.S. Government, and they would be entitled to their proportionate share of the output, either for use or resale.

Six, Saudi Arabia and other producers might be persuaded to increase their current production in the light of their share of the output of the corporation down the road.

Seven, the impact on the Federal budget should not be significant. The corporation's original \$5 billion capital could be funded with the proceeds of the windfall profits tax. Domestic borrowings could be off-budget with the use of guarantees or, to the extent budgetary impact is foreseen, the windfall profits tax could be used in later years. Sales of nonguaranteed bonds to foreign governments would of course reduce any such pressures.

Eight, the potential inflationary impact of such an endeavor on the economy cannot be overlooked. Therefore, to cushion any such impact, binding commitments on the part of business and labor with respect to wage and price restraints, work stoppages, et cetera, should be part of such a program. In a real sense, a social contract should be negotiated.

Nine, the charter of the corporation might be made sufficiently broad to include financing some of the rail and barge capacity which will be required to handle planned coal movements over the next decade. Some estimates of the investment required by 1985 for coal movements both for private railroads and ConRail range up to \$10 billion. Some of the weaker roads may not be in a position to make the investment on a timely basis, and the ability to inventory

equipment and lease it to the user may be an important one. This is obviously a peripheral issue, but might be worth considering.

Ten, it is obvious that the corporation's activities will generate—both directly and indirectly—significant incremental capital spending and manufacturing activity. A significant amount will be standard manufacturing activity vital to this country's well being. It should be the policy of the corporation to require contractors and subcontractors to perform a certain percentage of the work in the higher unemployment, impacted areas of the country. Industrial parks in urban areas can be made available and the synthetic energy program can and should be used to attack some of the more stubborn unemployment problems.

Eleven, smaller regional development corporations such as the presently planned ENCONO—Energy Corporation of the Northeast—can be an integral part of such a program. They can focus on medium-sized projects and be an important element in creating nationwide local participation.

Twelve, the board of directors of the corporation should consist of private citizens appointed by the President with the advice and consent of the Senate. All financing should be approved by the Secretary of the Treasury. The President, Secretary of the Treasury, and Congress should receive annual reports, independent audit reports, and a biannual independent evaluation of the corporation's activities.

FINANCIAL RISK TO THE AMERICAN TAXPAYER

There is no question in my mind that significant risks are involved in such a project. Real financial risk to the American taxpayer as a result of new technology, risk of corruption, waste, et cetera, in the management of the enterprise, risk of relaxation in conservation effort, in the development of other types of technology, and many others.

In my judgment, however, the risks are minute compared to the risks of inaction. It is already a disgrace that nothing of substance has happened since the 1973 oil embargo to promote our independence from foreign sources. Not only has nothing been done, but we are more dependent than before. It is an unacceptable security risk to so remain; it is an unacceptable industrial risk to face supply disruption; it is an unacceptable financial risk to expose the dollar to constant pressure and make our banking system hostage to OPEC short-term deposits.

When I indicated at the beginning of my testimony that I believe this problem to be a potential threat to our system, I was not engaging in empty rhetoric. I believe we underestimate the fragility of western democracy. I would not like to gamble on how it would fare in a lengthy period of reduced standard of living, which our energy problem and inflation can lead to.

This proposal will be attacked ideologically from both ends of the political spectrum. Liberals will charge that Government guarantees will be give aways to big business; conservatives will charge that this puts the Government in the energy business.

Nonetheless, the fact that both privately owned plants and publicly owned plants will be involved will provide a most useful check

on construction costs and operating performance and will measurably accelerate the program. The only relevant ideology here is the need for independence.

We should move ahead with this or a similar project in short order. We should do so as the beginning of the American answer to the problem. We should offer foreign governments a participation but we should go ahead whether they participate or not. This is not a revolutionary concept; the European Coal and Steel Authority, the Common Market, and other European structures were much more venturesome in concept and remarkably successful in achievement. It is time for us to innovate again, to act instead of just hoping for the best. If there ever was a risk/reward ratio that favored action, this is the one.

Thank you, Senator.

Senator RIEGLE. Well, thank you very much, all of you, for your presentations.

Let me ask first, Mr. Rohatyn, do you detect in the circles in which you travel, in the business community and the financial community, that there is a consensus developing that supports both the need and this concept for breaking out of this box? Is there that kind of developing consensus that you can detect?

BREAK-OUT OF IMPRISONMENT

Mr. ROHATYN. Well, certainly, Senator, in the business community I would say both here and abroad there is an enormous feeling that we have to break out of this imprisonment that we're in, both from the point of view of the dollar, from the point of view of our security interests. From the point of view of being able to plan the future for a lot of American businesses, assurance of supply is even probably more important than price.

And second, that in terms of inflationary impact here, this year we have had a \$20 billion increase simply in the price of imported crude. We haven't gotten more crude; you just paid \$20 billion more for it, or we're paying \$20 billion more for it, which is simply like burning the money up in a furnace, because it doesn't create another job or tax dollar in terms of our receipt.

It seems to me to be an intolerable pressure on the American economy and financial system.

Senator RIEGLE. So I gather what you're saying is that you do detect there is a consensus developing among the top people in the business sector and in the financial sector to move in this direction, a sort of common identification of the need to strike out in a dramatic fashion? Is that a fair summary?

Mr. ROHATYN. Yes, I would say so.

Senator RIEGLE. Do you think the business and financial communities are prepared to be full partners? Is the perception starting to develop into the kind of consensus where there would be the talent-sharing, and commitment of effort that if we were to seek top operating executives now to come in could we really get the show on the road?

Is it your sense that the perception of the urgency of the need is such that we get that kind of a response, absolutely a top talent level?

Mr. ROHATYN. Yes. I don't think there's any question of that. Senator RIEGLE. Let me just ask the others. Would that be your sense, as well, in the circles in which you are traveling, that there is a developing consensus both in terms of thinking now in the private sector and the business and financial community that this needs to be done, and they're willing to come forward and be full partners in terms of sharing talent and making a commitment in all forms that would be needed to really move this thing and move it in a hurry?

Mr. CUTLER. Senator, from the responses we have had, I don't think there's the slightest doubt. I agree with Felix entirely on that.

Sam Johnson had a wonderful saying that the threat of hanging wonderfully concentrates the mind. And I do think what you might call the "leadership community of the United States," the business and financial communities and the general public are way out and ahead of the Government in all of its forms on this general subject today.

The public cannot understand why the Government cannot make up its mind. I think it's just that simple. I think there's no question you could recruit men like John DeButts, as we suggested, who has no connection with the oil industry and has recently retired as chairman of A.T. & T. He's living just a few miles from here in retirement. There's no question you could attract men of that caliber. I don't know about Mr. DeButts himself. But if you don't create this in corporate form, if you put it in charge of an assistant secretary of energy and ask Mr. DeButts or Mr. Rohatyn to go to work for him, you can forget it.

Senator RIEGLE. Let me go to the question of the scale of effort here. I'm going to try—we have a practice in the full committee to try to go in 10-minute segments. I'm going to try to abide by that. We have a light system here, but I don't think we've got anyone to operate it. We'll try to do it by watching the clock.

In terms of the scale of operation that you're talking about, today there's some difference of opinion here. Moorhead starts out, he proposes a 500,000-barrel-a-day capacity. And Mr. Rohatyn, you're thinking in terms of 1½, something in the range of 1½ million barrels a day as the sort of target capacity to shoot for. And you folks are talking in terms of something on the order of 5 million barrels a day, and those are quite different in terms of the range of capital requirement and how fast you could get this done.

I think it also relates importantly to how concentrated the effort has to be as to whether we try to do it over a 5-year stretch, or whether we have to extend it out over a longer period of time.

I'd like you to consider some of the financial and economic impacts coming out of these quite different notions about scale.

Mr. Rohatyn suggested the capital cost per million barrels of synthetic fuel capacity will be about \$35 billion. I'm wondering: Wouldn't the capital cost per unit of output rise rapidly as the scale of the project were expanded because of supply pressures on those resources that would be needed in a construction of synthetic fuel facilities and the pressures that would otherwise arise from withdrawing these resources from alternative uses?

And it concerns me, because it seems to me there's probably sort of a digestible scale that we can handle without enormous distortion, and beyond that point we'll probably get a sharply rising cost. I'm just wondering how you hit upon your scale, and how you see the economics of that scale.

And then I would like also to get a reaction.

5 MILLION BARRELS A DAY

Mr. CUTLER. We consider 5 million barrels a day, Mr. Chairman, as a goal somewhat similar to President Roosevelt's 100,000 airplanes just before World War II. The issue is not really that important an issue for the first year or so of the program, and none of us would really know until you worked your way through that first year how deep the problems would be.

But if you think of a synthetic fuel plant on the order of 50 to 100,000 barrels a day as being a desirable scale for a plant, even if you had a million or a 1½-million-barrel-a-day program, it would take Mr. DeButts and Mr. Rohatyn, just to use names, a year or 1½ years at least to make 20 deals of that order of magnitude.

So if we just got started and gave them, let's say, a first-year goal, or first 2-years goal to get under their belts, by that time we would know a lot more about how fast the program could go, and whether it is possible to reach the 5 million barrels, which would certainly be desirable, if it could be reached without excessive inflation or harm to the environment.

If we get the recession we're all talking about, and a couple of more oil shocks in the Middle East, might very well guarantee it, this might be the perfect kind of program to stimulate the capital goods market and employment at a time when we want to do so, and without much pressure on the inflation side.

Senator RIEGLE. But I gather what you're also saying is that almost regardless of what other factors we run into, as you see the strategic merits here, it has to be done. It has to be done within this timeframe regardless of how the economy effect plays itself out.

I guess you're arguing that it might be a countercyclical gain here if the forecasts on recession hold up?

Mr. CUTLER. If nothing else happened, it's conceivable. We can't depend on it, but it's conceivable that the stimulus we have already given to new oil and gas drilling around the world might produce a few great bonanzas in a few years. If it does, you could moderate this kind of program, because your degree of dependence, at least on this one very fragile area, would be diminished.

Senator RIEGLE. You're saying you would probably set the goals in stages in a way that, takes the first bite at 2 years. What you might try to do might not be that much different from what Mr. Rohatyn suggests. It would be more a question of how sharply you try to build up beyond that point after you really get into the game and you start generating some results.

Mr. CUTLER. I think the three of us would be entirely happy with Mr. Rohatyn's proposal, which we think is an excellent proposal, if you built into it that the President was directed to study and recommend to the Congress what further should be done to build

up toward a higher goal, and let the Congress decide whether to expand this program.

What he proposes will keep the best people we have in and out of Government very busy for at least a year or 2, getting that many projects going.

Senator RIEGLE. Could you help us understand better your sense of the overall financial lay of the land as to why you pick that scale of capital availability as being one that is sufficient, but yet doesn't overreach in terms of causing other adverse things to happen?

Mr. ROHATYN. Well, Senator, I kind of backed into this 1½-million-barrel figure by my essentially making a judgment as to what the commitment in terms of size to the project would be, large enough to be an ultimate possible deterrent to OPEC, and a beginning for the independence without so—without terrifying the finance markets and beginning to suggest that the Government would pump so many dollars out of the economy for this purpose as to create a real problem.

I came to the view that probably financing an incremental \$10 billion a year, as long as at the same time it was known that it would not exceed \$50 billion over a 5- to 7-year period, that that was an absorbable amount without making other financing efforts for the Government, which would be too troublesome.

I also think there are two other aspects of this that I feel reasonably strong about: (a) that you limit the total outstanding commitment to a number like \$50 to \$55 billion in order to force the resale of the plants into the private sector if you want to go on to a second level of investment.

And second, that the corporation go out of existence after some finite period of time, whether it's 10 or 15 years, is not terribly important to me; but that at some point everybody knows that this will be a project that will be liquidated, that it's a bridge to get us from here to there, but it is not intended to create a permanent entity where the Federal Government will subsidize any kind of a fuel program.

So I backed into the 1½ million barrels, because I've seen studies from the CED, from all kinds of other people, suggesting that with about \$50 billion of investment you get about a 1½ million barrels-a-day of synthetic capacity.

But as I said, I am not a technician. Sometimes I'm not quite sure what I am, but I'm sure not a technician. And the 1½-million-barrel-a-day figure was derived. It seems to me, however, since it represents maybe close to 20 percent of our imports, that at least it would be a significant number in terms of the term.

Senator RIEGLE. I'm impressed by that argument. It seems to me the target size has to put a big enough bite in the problem that you get a whole second level set of gains in terms of putting everybody on notice that this is a deadly serious commitment proposition from the worried American consumers to foreign oil suppliers.

And I'm concerned that it be within our capacity to handle it, especially if we are going to be in a sliding economic situation.

Mr. IGNATIUS. Senator, could I make a brief comment? I agree with what you said. I would add the further thought that the commitment to production, as opposed to the continuation of re-

search and development, is also extremely important in showing the will that we would have in this country to do something about our predicament. I think that's an awfully important part of it.

Essentially, what we're saying is we have a number of research projects going on. By 1995, certain things will happen. I don't think the situation we face permits that kind of orientation. We've got to commit to production. The quantity ought to be reasonable and as orderly as it can be in order to avoid building up prices in the manner you said in your earlier comment.

Mr. ZUCKERT. Excuse me, Mr. Chairman. I find myself perhaps in just a little disagreement on this business of 5 million barrels. I'm not a technical person, but from listening to the technical people, I think that 5 million barrels, say by 1990, is a practical goal. I don't think it can be reached unless that is thought of as the objective; it won't happen if it's just done bite-sized.

THE LONGER A PROGRAM, THE MORE THE EXPENSE

My experience is, at least looking at defense production, the longer a program goes on, the more expensive it becomes. I think there needs to be a lot of thinking and planning at the outset in terms of 5 million barrels. This doesn't mean that you don't have the power to turn it off or moderate it or slow it down, but the planning for 5 million barrels is of tremendous importance if you ever expect to reach the goal. The kind of planning I envision will identify the long lead time components of the program.

Senator RIEGLE. We've got a number of areas that I think we need to explore here that relate to the environmental problems and how we might deal with them. We also have some comparisons with what our experience was in World War II, where there are some useful insights we can try to establish here today.

But, before I yield to Chairman Proxmire for questions, I just want to respond myself to a couple of things that have been said here. I think the problem is exactly as serious as it's been stated here today. I know we need the consortium effort between the public and private sector. And I think that we've let our adversary feelings grow beyond any reasonable point in terms of various sectors of our economy, whether we're talking about management versus labor or business versus Government or regions versus one another.

I think we are in a war-type situation. It just doesn't make sense when we've heard other testimony to the effect that we're in a situation where we've got a 5-day supply of oil in the United States and we are depending upon 45 percent of our supply from abroad, and Europe is sitting there with roughly a 90-day reserve, in the event that one of those hopefully avoidable shocks might come in terms of the international supply side.

We're going to have to move very rapidly, and I think the only way you can do that is with an authentic team effort.

It's going to have to be streamlined and in the hands of competent people. I must say, I like very much the idea of a board in which all the key players are represented. There's no reason to freeze anybody out in terms of having the public interest fully and broadly and in the full sense, represented in the kind of oversight

that ought to go on here. I know if we—unless we're willing to think in big terms, I think that's what this is, but it's big in terms of the departure from the way we've been sort of tinkering with our problem here, and basically spending time probably finding people to blame—rather than finding answers and a way forward.

That is why I think these ideas are on track. And I think finally, that the best test of that will be the degree to which there's a national consensus that develops. That's not to say that anybody has a perfect formulation at this stage of the game.

You're saying that you feel that you do, and clearly, we don't have that check. But it seems to me, what I'm hearing from the public and private sectors, and even from people in Government that are charged with the energy problem, is more and more a consensus view that we're going to have to take a bold set of steps.

And this is one, perhaps the most promising, because here we're not talking about having to invent technology. We know clearly what to do and how to do it, and probably can bring it on line faster than anything else, in addition to things like conservation and other steps we ought to be taking.

I want to make it clear that at least I feel very strongly, that this is essentially something that is absolutely essential, and the thing that's frustrating is we're late and we're getting a late start. And that means we have to do an even better job of assembling the talents so we make up for lost time.

Senator Proxmire.

Senator PROXMIRE. Mr. Rohatyn, as always, you're extraordinarily intelligent and thoughtful and certainly helpful on this puzzling situation that confronts us. But, I'm not sure why you settle on synthetic fuels with such enthusiasm, since you indicate to us you're not an expert in the field. You're an expert in financing. There are lots of other options.

ALTERNATIVE CHOICES AVAILABLE

For example, the Workshop on Alternative Energy Strategy sponsored by MIT, including the president of Atlantic Richfield, retired board chairman of Detroit Edison, the board chairman of Allied Chemical, and others with similar credentials concluded: "Energy conservation may well be the very best of the alternative energy choices available. Its advantages and benefits are substantial. It's been estimated we can reduce energy consumption by 40 percent with known technologies without undermining our quality of life."

Lester Lave, of the Brookings Institute concluded that if we could build an automobile engine factory to replace all the engines which get less than 27 miles per gallon or less, the energy saving would be greater than the amount of synthetic fuels produced, and the cost would be less.

Now, you said—and you had an excellent statement here about how we do run a big risk, risk of corruption and waste, risk to the American taxpayer, risks of relaxation in the conservation effort. Then you said we've done nothing.

We've done a lot of things. And we're about to do other things that would address this problem. The Chairman of the Energy

Committee, Senator Jackson, has introduced a bill which provides the following: \$500 million for solvent refined coal, No. 1. This is a construction project. Solvent refined coal, No. 2, \$700 million. IBTU coal gasification plant, \$600,000. Low IBTU coal gasification, \$75 million. 50 megawatt geothermal, \$175 million. And then IBTU coal gasification, \$600 million. And so on—a total of \$3.4 billion that's been introduced.

It's been sponsored by 15 or 20 other senators, and, obviously, is going to get very serious consideration. As you know, we're spending about half a billion dollars now in synthetic fuels research a year. So we are doing something.

Now, what you folks seem to say is a verdict first, trial later. We don't know whether this research is going to do any good, but let's start building plants right now. After all, it's only the taxpayers' money. We only stand to lose a few hundred billion dollars.

So, what's your answer to that?

Mr. ROHATYN. Well, obviously, it's not a short answer, Senator. As I said, I am not a technical man, but I do read a fair amount and I've read some fairly persuasive arguments that at least this is something that should be tried.

Second, when I said that I think nothing has been done since 1973, I really don't think a lot has been done. I think when this 1973 OPEC put the handwriting up on the wall and we find that today, we import a greater percentage of our energy than we did in 1973, that the price of the energy has quintupled. That recycling of the dollars is still the same fantasy that it was before. And that we're about to either bankrupt the system—which I think is a real possibility here, in terms of a financial capacity of the banking system. I really don't think we've done a hell of a lot, and I don't think the perception, at least in my world, is that we've done a great deal.

I don't think the perception abroad is that this country conducts itself as the leader of the western world, because we're so vulnerable today.

Senator PROXMIRE. You say we haven't done a lot. Isn't it true that we have engaged, as some of these figures indicated, in stepped-up research into the technology? You just can't say you want those results in 30 days and expect to get them. It takes a while for these breakthroughs to develop and we need some patience here.

Mr. ROHATYN. What I gave was my view of the financial structure and the nontechnical structure of this corporation, what it should be if its decided to go ahead with.

Senator PROXMIRE. You know how often—

Mr. ROHATYN. If I may just finish.

Senator PROXMIRE. Yes, sir. I beg your pardon.

Mr. ROHATYN. The reading that I've done—and these gentlemen are obviously much more knowledgeable than I—suggest that the technology is there. If indeed that's the case, then I think the risk of going ahead is smaller than the risk of not going ahead.

Senator PROXMIRE. That may well be.

Let me just say that we've seen over and over again, especially in this committee, we get a problem. We throw money at it. We throw money at the education problem, at the cities problem, and we

don't get any solutions. It doesn't get better; it gets worse. Education, in the last 15 years, has been a disgrace in this country. Every year, we pour more money into it. We're pouring four times as much money as we were 15 years ago.

Of course, in the cities we were putting \$2 billion a year into our cities. And now, \$85 billion a year. And according to a study by Brookings 2 months ago, it's worse. It's not a matter of just saying, "Let's have the guts and courage to act boldly and put the taxpayers' money into it." We want to know what we're doing, and how do we know what we're doing until we have research that tells us whether or not a particular way of going is the best way to go.

Mr. CUTLER. Senator, you're right on target. 500 of you can't decide how many hundreds of millions of dollars to put in a coal gasification project or each of those projects in Senator Jackson's bill that you read off a few moments ago. The Congress of the United States can't decide those things. We've been 13 years figuring out how to get Alaska oil to the Midwest and you haven't figured it out in Congress yet. It's a very difficult problem.

Senator PROXMIRE. Some of us did. I voted against that line.

Mr. CUTLER. Someone will run against Congress and say, I had the right idea. What we're talking about is giving this job of decisionmaking to somebody and creating a corporate structure with which it can be done.

Now, MIT—you brought up the MIT people. Of course, conservation is important. But, you must have read Carroll Wilson's piece in the Post yesterday or the day before, in which he and his colleagues at MIT are proposing, essentially, the same thing we're proposing. They're saying: Let's do it for 10 percent of our oil imports instead of Felix's 20.

And they have a somewhat different method. They say: Let's make every refinery use at least 10 percent of synthetic oil, as soon as we get into production. They think the technologies are here.

The South Africans are building these plants. The Germans built them in World War II. The technology is there for some of these processes, which can produce for very close to the present market price, and the present market prices in 1979 dollars are going to double in the next 10 or 20 years anyway, and we all know that. And that's not inflation. That's in 1979 dollars.

Unless we add to the supply, you must decrease the demand side. But we must add to the supply. And the only way we've ever known how to add to supply is to give the job to a couple of top people and let them figure out what to do.

OIL COMPANIES NOT RISKING THEIR MONEY

Senator PROXMIRE. Mr. Cutler, if the technologies are there, we have oil companies and others with massive amounts of capital. They are very happy to do what they can to make money. If the technology is there, why don't they invest in it? These are practical men. They know the business. That's their life. But, they're not putting the risk in their money.

Mr. CUTLER. The risks go beyond business risks. There are, to a very high degree, political risks. It will be another 5 to 10 years before it is so clear to the private market that you can make

money going this way. And that's 5 or 10 years that we cannot afford to lose.

Senator PROXMIRE. You gentlemen are some of the finest lawyers in the country. I have great admiration and respect for you. You all say you're not experts in this area. Why don't the people who are experts in the energy field, if this is so promising, why don't they come up and tell us that? Why do we have people like the head of Atlantic Richfield and others tell us that the best way we can go for now is conservation?

Why don't we rely on the private sector? That's painful—we'll pay a higher price, but a price that will eventually make it feasible to go this way?

Mr. IGNATIUS. I think many of those experts, and we've talked to some of them who believe this is feasible and should be done, would be prepared to testify if the committee were to ask them. The burden of our argument, I think, is that what might happen in the normal course of events, over a period of time, needs to happen more quickly because of the perilous situation that we face as a country. And that being the case, we need to involve the Government as a catalyst to get this going with the intent that the plants would be sold as quickly as they could, to generate more funds, to get additional plants going in the way of a revolving fund. And that we have a specialized kind of management here through an accountable corporation with assigned goals and results to be expected, in order to avoid the kinds of problems you mentioned in the cities and in education, and so forth.

There should be a specific target and a determination to carry it out.

Senator PROXMIRE. How did you work out your timetable? You say by 1990, a million barrels. We expect only to bring in 230,000 barrels by 1989. And of course, it's a long, long time to construct these plants. Permits, and so forth, it's not easy.

Mr. IGNATIUS. Yes, sir. We make the assumption that there could be some way of streamlining the process of siting and the obtaining of licenses. But within that assumption we talked to three or four technical, qualified people who thought that a capacity of 5 million barrels a day, in 10 years, we said 5 to 10—and I think we're overly optimistic on the 5 part of it, Mr. Chairman—but 10 years, or in that general range, was a feasible thing to do.

There are other proposals that have been made that go beyond that. There is one that we've seen that talks about a 7½ million barrel-a-day capacity by the year 2000, and a 5 million barrel-a-day capacity by 1995. We're saying that by 1990 it could be done, and a number of technical people have told us that can be done if there is an urgent program.

Senator PROXMIRE. Let me ask one more question before I yield. But Mr. Rohatyn, you would settle for 1½ million barrels a day, which is a one-third of what the distinguished gentlemen on your right are calling for. Saying that you thought that more might have a crowding effect on the capital market and might affect some of the weaker applications, such as New York City's. We're very concerned about that in this committee, of course, and we're concerned about the capital market generally.

If we go as far as they advocate, because it's technically feasible, and so forth, isn't that likely to have adverse effect on capital markets?

Mr. ROHATYN. Well, as I said, Senator—

Senator PROXMIRE. Inflation?

Mr. ROHATYN. Those are numbers larger than the numbers I'm talking about.

Senator PROXMIRE. That's larger by threefold.

Mr. ROHATYN. Well, what I'm suggesting, though, Senator, is that—and I'm not sure that there is that much difference between us.

Mr. IGNATIUS. You're talking 1985, too, aren't you?

Mr. ROHATYN. Talking about ultimately where we get to. I would like to limit the amount of commitments that are outstanding at any one time from this corporation to \$50 billion. If the corporation—if the need is to go beyond, I would then push to have as many of these plants resold to the private sector as early as possible and a reinvestment program take place.

If ultimately there is a need to spend \$100 billion, fine. But let's not all do it with public sector money. Let's have a revolving fund.

Mr. CUTLER. Some of the plants might be in the private sector in the very beginning. We doubled aluminum capacity during the Korean war and we almost doubled nickel capacity, including new products that had never been marketed before, without spending a dime of Government money. We issued market guarantee contracts and we gave 5-year tax amortization certificates. The Government's commitment was that any part of the output that you can't sell for 5 years, at either market price, as some contracts said, or at some formula price, the government will buy.

Senator PROXMIRE. The plants you described had no competition.

Mr. CUTLER. Of course they did.

Senator PROXMIRE. These plants will have competition from cheaper imported oil.

Mr. CUTLER. These plants had competition. They had higher costs than the existing aluminum plants. They were built to meet the accelerated demand for aluminum during the Korean war because of the airplane program, and ran the risk that as soon as that was over, and it ended in 2 years, the demand would drop and the aluminum would no longer be needed.

Senator PROXMIRE. We're very hopeful we won't have an accelerated oil demand.

Mr. CUTLER. The principle is exactly the same. In fact, there was a drop in demand after the war and a good bit of that aluminum output for a year and a half was sold to the Government.

And Mr. Ignatius and I negotiated across the table for a year, when he was in the Defense Department, to buy back that aluminum from the Government. Ultimately, when the market turned, it was all resold by the Government at higher prices than the Government had paid. And the net cost of the aluminum expansion program during the Korean War to the Government of the United States, from beginning to end, was zero.

Senator PROXMIRE. My time is up.

RESEARCH PROGRAM COST \$3.4 BILLION

Mr. ZUCKERT. May I address myself to one more point? You talked about the research program of the Department of Energy. I think they're spending \$3.4 billion, something like that, on research. But, those programs have a far out goal. I think they're looking for the best way to go. And this is far different from finding the fastest way to go.

There's a point at which you have to take it out of research and development, as you know, and put it into production. That's what we're talking about. It's an entirely different philosophy than what we've been pursuing in the Department of Energy for the past few years.

Senator LUGAR. Mr. Chairman, I want to take just a moment to try to set the stage in a little different way, because our distinguished committee chairman, Senator Proxmire, has thrown out the idea that a "verdict now, trial later" situation is involved in your testimony.

In short, I'll ask Mr. Rohatyn whether, in fact, the 40 percent increase in conservation that a group at MIT purported to have come up with now is a more appropriate solution than the production effort that you had suggested. I think that this type of rhetoric, that conservation of that dimension is a viable alternative, abounds in this country among certain groups. But, it has almost no relevance whatever to what we're talking about today for very good reasons. That a good number of groups, World Watch comes to mind as one that has been taking a look at production of grains and wool and energy sources, including natural gas and petroleum, found that in the 1970's, long before we came to this particular year, the per capita production of all these basic items needed for human beings has been in decline all over the world, and will probably stay so for a long time.

Even if we dealt with the food production of the world in the next 40 years, we would still have less per capita than we have now, by doubling production, so that more food is produced than in the 12,000 years before this point—the point that I'm trying to make is simply that what is true in the food area is very clearly true in the energy area, too.

If we're even to maintain a basic standard of living in the world, we're going to have to have as much as a doubling of resources against very considerable constraints. And this takes in view all the population control devices, all the governmental plans, all the rational choices people might make in the next 40 years.

I think that we're faced right now with a situation in which the oil minister in Iran is quoted in the Wall Street Journal with the Iranian strategy of saying, in fact, there is no need to pump more. You simply charge more for it and that would be their strategy. And second, he says: "You, in the United States, won't get any of it, anyway."

This is not only a critical situation. One can become perhaps too highly emotional about it. But, I think you are in saying that we have a situation here in which our national economy or democracy, everything we're talking about, could falter very substantially. And

you're coming before us as four gifted attorneys, saying we've got to have some leadership. Thank goodness, you've provided it.

The article in *The Washington Post* was thrilling—everybody saying where in the world is some leadership? If I were President of the United States, I would have taken your article, gone on TV and said this is a good plan. The American people want production now, and they are not about to quibble around with whether 40 percent conservation is possible. They want more oil now, and they deserve more oil now. And they're not going to get more oil now, because your timetable, good as it is, is 1, 2, and 5 years down the trail.

But the facts of life are, there is a constituency in this country for your ideas, a very, very, large one. Now, in a very modest attempt last Thursday on an agricultural bill, I offered an amendment that extended something we had already done in Committee in the gasohol area the Agriculture Committee bill provided \$180 million in loan guarantees for various ways in which alcohol might come from agricultural products. I suggested that that really is unsatisfying to anybody at this point, on the gasohol, whatever people think about it. The Senate accepted by a vote of 82-10 my amendment to increase this figure to \$500 million.

And there are a great deal of scientific controversies, as with things you're talking about, alcohol production is a known productive process. It's being pumped in people's tanks in the state of Indiana in 70 locations now. It is not hypothetical.

GOVERNMENT LOANS TO PRODUCE GASOHOL

The question is, How do we get more of it in the tanks this coming year? And you do so at least, as I suggested, by \$500 million worth of Government-guaranteed loans to people who are going to produce gasohol out of sugar cane residue, or anything you can find to get the job done. It's a Government-guaranteed loan process with something that's a known quantity. No one's going to lose a dime on these gasohol loans.

The quality is known. The market is inexhaustible for it. I just want to say that I believe that we could quibble back and forth on what there ought to be precisely, who implements them and how long their terms might be.

But over the need to produce, and that is the essential item of your testimony today, is there's no longer time for quibbling around, but the need for producing gallons of something into our economy.

Now, the real question I want to raise with you, because perhaps you do not want to frighten the public with pots that are too big, but you suggested as an overall goal, and by much the same analogy as the 100,000 plane idea, that 5 million barrels a day by 1990 is a reasonable thing to shoot at.

Is it feasible, as a matter of fact, to produce ultimately all of what we are importing; or, to state it another way, if my suppositions are correct, by the time we get to 1990, the demand in this country, even with every conservation item in place, is going to be substantially greater for petroleum or petroleum substitutes than

it is now. And that's because the people in this country will have a demand and a legitimate one in terms of standard of living.

Really, what is the potential in terms of synthetics? Why depart from what appears to be a reasonable, phased-in, nonupsetting capital flow in this type thing? Or is there any other alternative?

Are you supposing that the world will remain stable enough that we'll get half of our imports still at a reasonable price? Or is there a very real possibility we shall have to be thinking about utilizing considerably more expensive aid at that stage?

Mr. IGNATIUS. Senator Lugar, a 5 million barrel per day goal by 1990 or thereabouts is a realizable but ambitious and difficult goal, and would require the kind of urgencies that we've talked about and which I think you alluded to in your comment. Whether you could be wholly free of the need for imported oil by then, I would doubt. But I think, in addition to the kind of program that we're talking about here, there are other things which by 1990 and beyond could help to lessen our dependence on imported petroleum. And we ought to get on about those in appropriate ways, just as we believe the corporation we're talking about is the appropriate way to get on with the production of synthetic fuels.

Certainly, solar energy by 1990, and perhaps in the decade of the 1990's to the year 2000, offers great promise and should be pursued aggressively, I think, it is now beginning to be. Certainly we can do a great deal in the area of conservation in our homes, in our ways of getting to work, in many other ways, and in industry. And increasingly, those activities are occurring, in part, because of the high cost of the energy that we're buying.

All of these, if successful, will tend to lessen that dependence. But I do not believe we are likely to be wholly free of it by 1990. And if we have a world in which what you're doing here in synthetic fuels enables us to deal with the OPEC countries in what we've called a nonconfrontational way and extend the life of their oil asset, which is the only asset that they have, then maybe there can be a comity among nations and a feeling of greater security than perhaps is now present.

So that the notion of importing some doesn't strike fear in our hearts. Our problem today is the extent of those imports, our dependence on them, the insecurity in the area, and the consequences that occur as a result of those instabilities.

Mr. CUTLER. Senator, I would just like to add to that. There's no way in which we can answer that sort of question now. For one thing, it isn't so much our own dependence on imports, it's the world's dependence on one very small area. Conservation is tremendously important, as Senator Proxmire has been stressing.

But if we were to reduce our level of energy consumption for a unit of GNP to the European or Japanese level, we would still find the supply and demand lines crossing in around 1990 or thereabouts, because of the growth of energy requirements throughout the world, and especially the Third World, for which development and economic growth is so vital. You cannot have it without more energy.

PROGRAM NEEDED

But what we need to do is get started on a program. You were referring earlier to the desire of the public to see something done. The Italians, as you know, have a saying about their own politics, that the situation is desperate but not serious. Nothing gets done.

Whether we need ultimately 5 million barrels a day from synthetic sources or 10 million barrels a day, whether either of those numbers is even remotely feasible doesn't really matter right now. We can get started.

Certainly 1 to 1½ million barrels a day is within all of our financial and technological capabilities, with known methods of doing it that other people are using today.

Mr. ROHATYN. I just think, Senator, that leaving aside the issue of the level of our consumption in terms of industrial requirements, which is obviously way too high, I just don't think we can live with a financial drain of spending \$60 billion a year of balance of payments outflow. I don't think we can finance this indefinitely.

I heard the other day that Saudi Arabia is supposed to have \$140 or \$160 billion of dollar assets lying around in this banking system. And I think this is what you're going to face: The crunch of our financial problem, much earlier than you will face any kind of real industrial crisis because of supply terms, I think, unless the world goes to war.

I think you have not only got to do this, but you have—Senator Proxmire's absolutely right. We're going to have to conserve. We're going to have to use less.

I would put an absolute dollar limitation on the imports of crude oil at today's level of dollars, no matter what the price is, and put rationing on if the price goes too high, as a matter of absolute law. I don't think we can afford to do this.

I don't think next year, if this year it pleases the southern middle eastern shiek to put the price at God knows what, so we're going to have to spend \$65 billion next year—we just can't live with this.

There was an old cartoon in the New Yorker Magazine. It showed a man and lady falling head-down, heads through empty space, and it said: "We can't go on living like this."

Senator LUGAR. Following that up, is it your judgment that the only way in which the OPEC cartel could be broken successfully would be to put a dollar limit on our imports and to go into a full production policy of synthetic fuels? Is that a strategy we ought to employ, or is there a strategy?

Mr. ROHATYN. I don't think just reasoning is a strategy or hoping. I mean, hope is the biggest enemy of things, because you don't act. I think you have to be rational. I think you have to offer them to participate with us, because it will lengthen the life of their research.

But I think we have to be able to do without. I think we have to show some discipline. At some point, they're going to have to understand we can live without them. As long as they know, which they do today, that we can't live without them, where are the pressure points? There aren't any.

Senator LUGAR. But briefly, is that going to be enough of a demonstration? That is, import controls for the level on how much we import on the production place that is a 1- to 5-year situation?

Mr. ROHATYN. I think if we can show we can do with less of theirs and we can make more of ours, that's a beginning of a policy.

Senator LUGAR. One final question. Have you had any communication from the President or from anyone in the White House that read your article that lends some support or encouragement? Is this the first public forum you've had since going to press?

Mr. CUTLER. Senator Lugar, without giving you a direct answer, I think it clear by now that the administration is determined to go forward with a program built on Congressman Moorhead's bill and of a somewhat larger size and perhaps incorporating some of the features of organizational structure that we have suggested.

Senator LUGAR. Thank you.

Senator RIEGLE. At this point let me pick right up where we were here in terms of this colloquy that was just going on. Many people say that the principal benefits that would come from synthetic fuel development is that it would free us from dependence on foreign sources of supply that are unreliable; to some extent liberate us from the OPEC pricing qualities. It's essential to the national defense. All these things seem obvious.

But it seems to me there is a way to put this in a negative frame. And that is, one might say, we really would only be totally free from dependence on foreign oil if we were to suggest domestic energy production of the equivalent of some 8 to 9 million barrels of crude oil today.

I don't think this is probably possible within any kind of time frame that we can see, doing what you're talking about—what I'd like to see us do. But even starting one effect of this would be, as we're going around to synthetic fuel development at a premium price, that it's possible that the international price of oil will drop, we get out of the international market, and therefore the beneficiaries of our crash program could very well end up being some number of foreign consumers.

We might then be stuck with a higher-cost technology and using up our own resources at a rapid rate. I'm just wondering how we deal with that side of this issue or what your thoughts might be about it.

I'm interested in reactions from all of you.

Mr. IGNATIUS. Two comments. One of the reasons for involving our friends in other countries in some of these ventures would be for the cost differential possibilities that you talked about.

Second, we said in our article that if we could buy petroleum for less than what we could make it from substitute sources here at home, we have the option of placing these plants in standby. They are effective as a lever on price only if they're in being and capable of production.

Senator RIEGLE. I understand. That still doesn't solve some of the problems we're talking about here. That is, on doubling of the supply. It's solving the balance of payments situation.

I am impressed when I hear it said by Mr. Rohatyn that in his view we can't continue to handle the outflow of the balance of

payments deficits here, and in fact that might trip us up sooner than the shortfall in oil supply, which I think is a very powerful point we have to consider. It seems to me that we don't get that gain if in fact we've got the facilities and we're not using it.

It seems to me we've got to decide to make them and use them to get the full range of benefit.

SYNTHETIC FUEL PROJECTS CAN BE LAUNCHED OVERSEAS

Mr. CUTLER. There's also the strong possibility, Mr. Chairman, that synthetic fuel projects can be launched outside the United States, but within the other western industrial democracies. There are lots of potentials for coal-based programs in Western Europe, for example. There would probably be potential for coal-based or shale-based programs in Australia.

It isn't just to be free of imports that is so critical. It isn't a terrible thing to have Canadian imports or Venezuelan imports or North Sea imports. They're all parts of a single trading area, the loss of any one of which wouldn't be that serious.

It's a global problem in that sense. But there are certainly ways, and I gather that they're going to be explored at the summit meeting in Tokyo, among the seven principal western countries or industrialized democracies, of forming joint ventures on a multinational basis and financing one another's projects and joining in projects throughout the free world.

That would add to the supply side and the ability to become independent from Middle East oil, just as conservation is going to taper down the demand side.

Senator RIEGLE. I want to get to that. I want to get to the suggestion Mr. Rohatyn made in his presentation, that perhaps the Germans or the Japanese or South Iranians might be persuaded, and there might be good reason to persuade them in parting from the corporations.

I'm wondering what your reaction would be to the question I posed a moment ago. The issue is that if we lock ourselves into an increasing amount of higher-priced alternative synthetic fuels, might we not find ourselves in a situation where that accrues certain benefits to other international buyers and consumers, and therefore you might have a situation developing where American consumers would find this hard to swallow?

Mr. ROHATYN. You mean, Senator, where the producers would sell cheaper to the Europeans than to us, for instance?

Senator RIEGLE. It would seem to me that there would very well be some difference there. If we're coming in at a synthetic fuel component of our total supply that's got a premium cost associated with it, our average cost is going to have to be higher than somebody else's that is relying solely on foreign sources that are available, more available because we've withdrawn part of our demand for that foreign supply. It might well be they might end up with a lower price than we have.

Mr. ROHATYN. I don't see for the foreseeable future that we would be less than 25, 30 percent dependent on import crude in any case. I think that would be inevitable. We're going to be, for the next decade, unless there is a supply interruption, dependent

for a significant amount of import crude. If they drop the price, if they drop the price overall, we will benefit. We may have some marked larger internal costs because of our dependence on the relatively high cost of synthetics.

But at the same time, I think that would be offset by having reduced pressure on the dollar and reduced cost of our imports.

I think I would think in terms of an inflationary portion, it would probably balance out very much. And in terms of the security, you would have been a large step ahead. I don't think you can predict everything.

Senator RIEGLE. I think that's an important point, because even if we were to find ourselves in a situation of having built the facilities and feeling compelled to use it for these other advantages, just the gain in terms of recycling dollars in this country probably would go a long way in offsetting anything that might have to do with somebody else, for the time being, getting foreign supply at a lower price.

Mr. ROHATYN. Senator, to me there is no greater waste than simply paying more money for the same amount of imported crude oil without any increase in our production or tax receipts or anything in this country. We're just burning money.

Now, when we have to try to solve that by 87 different ways, the cheapest and the best, to the extent we can do it, is conservation. I don't think that will be enough. So you have to go to other things.

If we had a wartime and we had a supply interruption, we would be doing other things.

Senator RIEGLE. In terms of the idea of getting other countries to participate, could you elaborate a little bit on what you think is possible?

Mr. ROHATYN. It seems to me you have two countries here, Germany and Japan, which have big, big dollar surpluses at this point and which would both be large beneficiaries of this venture in terms of making more supplies available to them, as we become more and more self-sufficient. It would be to their advantage to have this happen.

Saudi Arabia, it seems to me—first of all, there is a totally unusable supply of dollars around here. And it has been said that they would like to support projects which would lengthen the life of their own reserves. This clearly would.

At the same time, I think it would be a great benefit to us to recycle some of these dollars on a real long-term basis, instead of having them on demand. I would certainly try to make a major effort to get them involved, because I think it's to their interest to do so. Whether it's politically feasible for Saudi Arabia to do it, I don't know what the answer is.

I would assume if the Germans came in here, the French and some of the other European countries might very well want to do it. I was just picking those three countries that I thought had the most clear and simple financial and operating interest.

But I would certainly push very hard, because I think it's clearly to their interest.

Senator RIEGLE. I gather that the gain for them, other than just being diminishing our demand for that pool of world oil that

they're also bidding for, is presumably they would get any technological gains that might come out of this.

Mr. ROHATYN. They could have their share of the output, if they were deciding to do it that way. I think the main gain to them—this is important to them—is to reduce our demand so they're not bidding against us in the Rotterdam spot market and paying \$40 or whatever is being paid today for crude oil.

PARTNERSHIP BASIS COULD POSE POLITICAL PROBLEMS

Senator RIEGLE. It seems to me if they were to come in on a partnership basis, I think that runs into a different kind of political problem. It seems to me if you're going to generate support in the United States that says, look, we want to develop some self-sufficiency and work our way out of that country—

Mr. ROHATYN. I think from the point of view of reducing our impact on world oil demand.

Senator RIEGLE. Let me raise the environmental issue in terms of problems we run into with the existing law. I'm not sure what the optimum size of the coal liquefaction plant is, but I've been told it's relatively small, on the order of maybe 50,000 barrels a day. So if we wanted to produce 5 million barrels a day, that would be talking about 100 sites. If you were going to do half or a third of that, we are up in a very large number of individual operating units.

I'm wondering what thoughts you have on a series of questions. Let me pose them all, and respond in the aggregate as best you can. And that is: What your thoughts might be as to where we would put these plants and how we're going to get the permits? The case of the Sohio plant line required 2,000 different permits, of which 1,500 had been acquired by the time the company finally had to abandon the project.

We also have to consider that each producing unit would have to have, presumably, an environmental impact statement under NEPA. We would probably in most cases, maybe all cases, have to have permits also in the Clean Air Act.

I'm wondering, too, with respect to the water side of the issue, if you've considered the permits that would be needed to discharge water under the Federal Water Pollution Control Act? And as I understand it, shale conversion requires a great deal of water, and most of the shale is unfortunately located where water is scarce. So obviously, we'd have to be interested in knowing what thoughts you folks have, again, for overcoming that interest.

All of this will take time, 2 years at a minimum, assuming all applications are processed simultaneously. I'm wondering, in view of that, which is today's reality, unless it's changed, how do we make the kind of headway we're talking about here within the time frame that we would need, or would we have to think in terms of a blanket exemption of some sort or some sort of streamlined process, where we would treat this separate and apart from the way we're going to be dealing with other operating decisions that could run into these same environmental problems?

Mr. CUTLER. Mr. Chairman, there's no question, of course, that all industrial activity has environmental costs, and certainly the

mining of coal or shale and the burning of coal or shale, whatever you do to it, will have significant environmental costs.

One reason why, or one of the many reasons why private industry hasn't come forward to bet all its chips on these new synthetic fuels is just that. They might spend half of it and never get their plant finished. They look at Sohio, 7 years getting all of the environmental permits that it needed.

But if the program is a Government-sponsored program, you would, at the very least, have a concentration and identification within this corporation we're talking about, of the need to go forward, and an identification of the bottlenecks that had to be broken and some Government energy being applied to the breaking of those bottlenecks and the making of the necessary decisions.

It's a choice, a conflict between two social goals or economic goals, and it has to be made. There are more effective ways of making those choices than how we are making them today. Senator Jackson's bill, which Senator Proxmire brought up earlier, suggests such a method. He proposes that the President be able to identify what is a critical energy project that needs acceleration, and he then provides for the setting of timetables by the President for making all of the decisions necessary in all of the various agencies.

He goes so far as to say that if any agency fails to make a decision within the President's timetable, the President can make that decision, and he provides for one single appeal on all of the environmental and other issues that are involved with expedited treatment, all the way up to the Supreme Court.

It is certainly a major problem. It is one of those choices we just have to face in this country. And I don't mean to downgrade the environmental side of the problem at all. There may be environmental costs from a program of this type, particularly as it expands in scale, that we will ultimately conclude are not worth incurring or that we must limit the program in particular ways, or perhaps incur extra cost to handle those environmental problems.

But at least we would have a process for making the decisions at the highest possible level.

Senator RIEGLE. I welcome any other comments, but is there any indication that the environmental difficulties here are ones that, short of blanket waiver, would stop us? In other words, is it your view that the environmental items are manageable by the technical people that you're talking to when you ask this question? Are they basically of a mind that reasonable people, sitting down and working on an expedited basis, can surmount that issue?

Or is there a feeling that this is a gigantic problem, that it's likely to stop us before we get very far down the road?

ENVIRONMENTAL QUESTIONS

Mr. IGNATIUS. First, if by overall waiver the question was intended to mean that—I'm sure it wasn't—that you would simply waive aside any environmental questions, the answer to that would be no, in this program or any kind of program. We simply can't waive aside environmental concerns.

In terms of this kind of program, there are some difficulties with shale in the West, much less if it's done underground than on the surface. Some of those environmental problems, if not most of them, with western shale do not appear to be present with eastern shale.

Wherever you burn coal, there is a concern about the amount of CO₂ that's in the air. And I think there are questions about that.

We are not experts here, obviously. We have talked with people who have gone into this more thoroughly than we have had an opportunity to. And I think they recognize there are some questions here that could require some kind of modifications along the lines Mr. Cutler spoke of earlier.

In short, my impression is if we go about this sensibly, with due consideration for these issues, identifying them promptly and having what we called in our statement a judicial and conclusive way of handling them so that we can get on with the program, then we'll be able to deal with the problems.

It may increase the cost some, but the cost is so high anyway that it would be sensible, in accomplishing an energy objective, not to do undue violence to our environmental resources.

Mr. ZUCKERT. I would agree with what's been said, Mr. Chairman, but people I have talked to have said they're mostly concerned about the length of the process. It's an open-ended process. There's no way to get there from here.

Senator RIEGLE. Mr. Rohatyn, is it your feeling that the environmental thing would pose the problem that beyond the sides, you think that side is manageable?

Mr. ROHATYN. I think it's a major problem, and I don't have anything to add to what's been said. And that's exactly what I feel.

Senator RIEGLE. Senator Proxmire.

Senator PROXMIRE. Mr. Rohatyn, I am delighted that you suggested one action we should really think about is limiting imports. It makes sense. I think we should push that as one way of achieving a greater conservation.

Senator Lugar seemed to feel that conservation was very desirable, but very unachievable. I don't agree. I think if we go at it, we can do it. It will take a lot of leadership. Prices go up. But, as you say, we can't go on living like this.

Mr. Rohatyn, your proposal not only includes massive Government borrowing to finance these synfuel plants, but you suggest wage and price controls, multinational government corporations, massive aid to railroads through purchase and lease arrangements and so forth.

Mr. ROHATYN. I didn't think that I had been all that dramatic, Senator, but I think that I had pointed out some areas that I thought were worth talking about. I think the wage and price—

Senator PROXMIRE. Do you think we have to have wage and price controls?

Mr. ROHATYN. No, I don't think this will create the need. I think you either have a need for wage and price controls or you don't.

Senator PROXMIRE. Yes, I thought you meant in this particular industry.

Mr. ROHATYN. I think you have a real opportunity if you embark on a large-scale national program that will involve clearly the

Government, in effect, taking a large financial risk, asking both the business community and labor to exercise very great restraint and statesmanship.

Senator PROXMIRE. What makes you think they'll respond?

Mr. ROHATYN. It depends, I guess, on other questions.

Senator PROXMIRE. They'll respond to a wartime scenario, but I doubt they will under present circumstances. Maybe they will.

Mr. ROHATYN. I would philosophically be inclined to go fairly far along the road of mandatory restraint in connection with a program like this. I'm not at all sure that my colleagues would share my view.

Senator PROXMIRE. We're moving into a situation where we're really beginning to regiment our economy and our life. We're talking about registration in the draft for all 18-year-olds; we're talking about mandatory wage-price controls; we're talking about rationing.

Now, we're proposing here a massive Government program of hundreds of billions of dollars of investment, which will require a great deal of Government regulation and so forth. Doesn't that concern you?

Mr. ROHATYN. Of course, Senator, but I think if the OPEC countries were to cut off our supply tomorrow, the regimentation would be greater.

Senator PROXMIRE. You say a nice simple limitation on imports?

Mr. ROHATYN. You can't limit it to zero, Senator.

Senator PROXMIRE. We didn't propose it. If you cut it down to—say, by 1 million barrels a day 1 year, and then maybe afterward 1 million barrels the next, and so forth, so that you did limit the imports and then create a situation which you have far more incentive in the marketplace to do many of these things.

Mr. ROHATYN. I guess, Senator, you're going to have a tough bit of balance program. I think that simply letting the price go up and having inflation pushed up, without new production, is not the answer, either. In fact, I would use the limitation on imports as a discipline and as a push to finance this program.

Senator PROXMIRE. Maybe it would, and it would encourage the program off. That's the way the marketplace is supposed to work.

Mr. ROHATYN. I believe we're facing a fairly serious recession. And the extent to which you want to break the economy, in light of this situation, I think that that requires a fair amount of delicate judgment. I would take the chance on limiting imports to the present amount of dollar volume and then reducing it gradually.

But I would do it in connection with a program such as this, Senator.

VICE PRESIDENT ROCKFELLER'S PROPOSAL IN 1976

Senator PROXMIRE. Mr. Ignatius, in 1976, Vice President Rockefeller came before us and proposed a \$100 billion energy program which we turned down. And I thought we were right to turn it down. Maybe we were wrong.

That \$100 billion program was one in which we would start producing very much in the nuclear area. Do you think if we had bought that program, we would have made a serious mistake of

great cost to the Federal taxpayer in view of what's happened since then? What's your response to that?

Aren't we likely to do the same thing here if we go along with the synthetic fuel program, on the basis of recommendations by people who are not sure of their ground in the area and then find we bought a turkey?

Mr. IGNATIUS. No, I don't think so. I went back and looked at some of the New York Times articles that were written at the time the Rockefeller proposals were made. And to the extent that it brought back the memory of them, it seemed to me that there is a distinction between what he was talking about in a far-reaching statement that he made, and what we're talking about.

And I think it's a specificity of our proposal. We're talking about one aspect of a national energy policy, which we believe represents an opportunity in a relatively short period of time, to lessen our dependence on these unstable foreign sources.

Senator PROXMIRE. You're proposing twice as much as he was. He proposed a \$100 billion operation, and you're targeting it more precisely. So, it would be an even more ambitious and generous commitment to an area which may not be the way to go.

Mr. IGNATIUS. Senator, first, we don't know with any certainty what the cost would be. But what we are quite certain about is that if we do the program the way we are talking about, the cost to the taxpayer would be far, far less than the \$100, or the \$200 billion figure that we're talking about.

Senator PROXMIRE. Let me ask you, Mr. Cutler, why don't you think that the administration—and maybe you do, is moving in your direction and moving the right way as far as you're concerned?

There's an article in the Wall Street Journal this morning that said: "President Carter, at the Toyko Economic Summit Conference next week, is likely to propose a new multinational body to assemble private and government financing for huge synthetic fuels projects in the industrial world."

It goes on to say:

The White House doesn't feel that the Congress is going the right way in this area. They're concerned that the federal investments or guarantees be made only in the projects with greatest chance for early success.

The Administration is working to prepare its own list of project proposals. To begin with, the White House plans to set a goal for how much imported oil can be supplanted by synthetic fuels, as well as how much can be replaced by solar power, by conservation, and by added U.S. oil and gas production.

With that goal in mind, the Administration will propose a set of possible investment approaches to spur synthetic fuels production.

The White House analysis won't be complete for about two weeks, but sources say officials are leaning more towards the House approach, which relies on minimum federal purchases and loan guarantees, as opposed to the Senate approach which favors direct spending on huge demonstration projects.

Do you think the administration's right in that course?

Mr. CUTLER. My sense of what the administration is doing is quite close to that article. I think it comes quite close to what we are proposing. I think I said that earlier, Senator, I believe the administration is concluding that a synthetic fuels program now, run in the sort of corporate form that we have in mind, built on Congressman Moorhead's bill, which does contain some of the very

powers that we have also been suggesting, is in order. And they also have in mind adding an international element to it.

But, as the article suggests, it's part of the program designed to bring down imports by a whole variety of measures, starting with conservation, which remains the most important, but doing more on this particular element of the supply side, namely the synthetic supply.

And we have been able to do that by having the government step in with private industry and get started on the projects which are technologically feasible and actually being built in other parts of the world today.

Senator PROXMIRE. Have you done any more detailed research than you've presented here? You have an excellent statement, but they're concise. I understand you may have a more detailed paper that you prepared.

Mr. CUTLER. We have nothing more detailed than the piece which appeared in the Washington Post. We've assembled a good deal of background material from some of the engineering and other companies.

Senator PROXMIRE. Will you provide the committee with whatever you can on that?

Mr. CUTLER. We'll be glad to. We're also working on a possible series of amendments to Mr. Moorhead's bill.

COST PER BARREL

Senator PROXMIRE. You say that you feel it would be—you testified it would be feasible to produce 5 million barrels of synthetic fuel per day by 1990. In arriving at that estimate, what assumptions do you make about the cost per barrel of synthetic fuel in 1979 dollars?

Mr. CUTLER. I don't think I am qualified to answer that question, Senator. I do believe that is the prevailing opinion today, inside the administration and elsewhere, that the price of natural petroleum over the next 10 to 20 years is likely to double in 1979 dollars.

Senator PROXMIRE. My second question was what you assumed would be the cost per barrel of the world price of crude oil?

Mr. CUTLER. I'd like Mr. Zuckert to deal with that.

Senator PROXMIRE. If we can get that, we'd have some notion of what the cost might be to the Federal Government.

Mr. ZUCKERT. Our cost assumption is that synthetic fuel could be produced currently at \$25-\$30 per barrel in 1979 dollars. Today's oil cost is \$20 a barrel and more. With a continuation of world conditions and inflation, natural imported oil could cost \$50 a barrel in 1990, and we believe that synthetic oil, though affected by inflation, would be clearly competitive at that time.

Senator PROXMIRE. \$50 a barrel. How do you arrive at that? That seems like it's out of the blue.

Mr. ZUCKERT. Sir—

Senator PROXMIRE. How do you arrive at the \$30?

Mr. ZUCKERT. We've arrived at that from talking with people in the engineering field who have been involved in this problem.

Senator PROXMIRE. Why \$30? Why not \$100 a barrel or more?

Mr. ZUCKERT. Because, Senator, there is a basis of experience in the South African SASOL project.

Mr. CUTLER. And the National Energy Plan that was filed by the Secretary of Energy—I think earlier this year—estimated the cost of oil from the tar sands and also from the Venezuelan heavy oil, in the range of \$20 to \$25 a barrel.

Senator PROXMIRE. We found that the price of coal and the cost projection for oil shale have risen at the same rate as imported oil prices. We're afraid the same is going to happen—

Mr. CUTLER. I doubt they took a 50 percent jump in the last year, which is what happened to imported oil prices.

Senator PROXMIRE. It seems to have happened to oil shale. We thought it would be feasible at this price only a few years ago.

Mr. CUTLER. My answer to that is if it's always \$10 more than the price of imported oil, it's still a very worthwhile insurance policy.

Senator PROXMIRE. Mr. Rohatyn, the Synthetic Fuel Development Corporation has existing technology to make a product in great demand whose market price is rising rapidly. From your statement, it appears you think synthetic fuel shows a good potential for solving energy problems. Given that case, why should there be any need for Federal financial aid to produce synthetic fuel on a commercial basis? Why?

There should be plenty of private capital available to do that.

Mr. ROHATYN. I think the risks involved today in committing to a plant of that size—and you're talking about \$1 to \$1½ billion plants, with market uncertainties and environmental uncertainties; and I don't think you have the risk capital involved here to get those off the ground.

I've indicated in my testimony: A, I don't believe this is the answer to our energy problem. I think a part of an energy plan that might bring about an answer—and I don't believe for a second that it's riskless. I just think it's less of a risk than alternate risks that I see.

Senator PROXMIRE. Would you tell me, Mr. Ignatius, what you think the budgetary costs would be of this program over the next 5 or 10 years? Have you made any estimate of that? I realize you have to guess at it; maybe you want to give us a range.

Mr. IGNATIUS. I can't give you a precise figure, because we haven't developed one. The budgetary cost would be considerably less under the concept that we have in mind, because this corporation—

Senator PROXMIRE. Less than what?

Mr. IGNATIUS. Would be less than the investment cost for the plants, these large multi-billion dollar figures we're talking about. If the corporation had the power to issue bonds backed by the credit of the United States, the budgetary impact of that would be considerably less.

Secondly, to the extent that the plants were built with private capital under market guarantee contracts, which is one of the ways we've proposed that this be done, there would be a far smaller budgetary impact.

But I cannot give you a figure here today as to what the annual budgetary cost would be.

Senator PROXMIRE. Would the foreign governments be invited in? Would they—as investment partners, would they have a say in the operation, and would they have an opportunity to buy the plants?

Mr. IGNATIUS. Well, it would depend. There is one project at the moment that is under discussion, a government-sponsored project at a cost of \$700 million; and the Germans and Japanese have agreed in principle, as I understand it, to fund half of that \$700 million cost.

I do not know the implications in that case in terms of your specific question.

However, if they're paying half the price and they're going to share in the output, they would have something to say, I would suppose, about the plant.

Senator PROXMIRE. If there were market guarantees, Mr. Rohatyn, available—just that—would that be sufficient, in your judgment, to get the private capital?

Mr. ROHATYN. Oh, yes, Senator, if the market guarantees—I think the question then is how much of a guarantee, at what price level?

Senator PROXMIRE. Can you answer the question?

Mr. ROHATYN. No, I cannot.

PRIVATE CAPITAL

I would say to you, probably as a general rule, which is why I advocate that, that until you have a experience with a project, you might find that market guarantees to ensure the private capital building, the plants.

But suppose the Federal Government has essentially the same amount of risk, and where ultimately the private operator has all of the upside, and the Federal Government has all of the downside. That's why I would like to see a mix of projects until the economics are more assured.

Senator PROXMIRE. Let me just ask you a final question.

I want to ask Mr. Cutler—this question comes from an institution with which Senator Riegle and I had some association, Harvard Business School.

Mr. ZUCKERT. We had association, too, Mr. Ignatius and I.

Mr. CUTLER. They were both on the faculty.

Senator PROXMIRE. Let me just give you a quotation and ask for a response.

“This sector analysis demonstrates the wide flexibility possible for energy use in the United States. Its extent was underlined in the recent report of a panel on energy futures assembled by the National Academy of Science, which looked at four different plausible and carefully constructed scenarios for future energy demand in the United States. The results were extraordinary—that in the year 2010, various similar conditions of transportation and other impetus could be provided in the United States, using twice the energy consumed; or alternatively, using almost 20 percent less than used today.

And this is with continuing economic and population growth.

The fundamental conclusion is there is much more flexibility toward reducing energy demand than has been assumed in the past.

Now, in view of that conclusion by the thoughtful experts who studied this in great detail and have a detailed article in Foreign Affairs on this, I'd like your response.

I realize that you've said, again and again today, that you're for conservation. Mr. Rohatyn has indicated this may risk the kind of conservation that we would otherwise have. This article, to me, suggests that that should be the major way we should go. We can have the economic growth, we can have the amenities we have now with conservation.

That just seems to me to be a far better answer than risking hundreds of billions of dollars on something that may not succeed.

Mr. CUTLER. Senator, it's a little bit like arguing as to whether a sea-based nuclear force is all we need or whether we ought to have land-based as well as sea-based or whether we ought to have air-based also and have the entire triad and whether we ought to have conventional forces in addition, and also, whether we should strengthen NATO. And we conclude it would probably be better to have them all.

There is no single answer to this. It may very well be of the three parts of the triad, the submarine is the best part. It may very well be of the various answers to the energy problem, conservation is the best part. But we also need the other parts.

It's also very important to remember that OPEC didn't invent this energy problem. It was there, anyway. They have brought it forward some.

If we get our consumption down to the .7 per one point of GNP, which is the European and Japanese level today—and we're over one to one today—even if we get it down to that, we still have a problem.

Those two lines are going to cross. Four-fifths of the world is only beginning to increase its consumption of energy. Those lines are going to cross within the next 10 to 20 years. We have got to do something more on the supply side than simply go out and drill for more oil and get more gas. It's going to take 5 to 10 years to get a synthetic program into production. I am saying: Let's get started.

Senator PROXMIRE. Part of the free-market approach is the conservation, and part of it, of course, is eliciting more production. I have great concern about what is going to happen to the Lugar proposal for a balanced Federal budget. Senator Lugar is a great advocate of that. I don't know how we can go on spending money and balancing the budget, as Senator Lugar properly asks us to do, if we are going to follow your plan.

Mr. CUTLER. I would rather provide jobs this way than through the CETA program. That's several billion dollars alone. In a couple of years we may be in just the kind of recession that would respond very, very well to just this kind of program. But unless we get it started now, it won't be there.

Mr. ZUCKERT. Senator, I am a little bit reminded when we talk about OPEC, I am a little bit reminded about what Senator Symington used to say: There is nothing worse than a choice of one. And I think that's the position we are in now.

The year 2010 is too far off for me to contemplate. We are late now, as far as insuring this country's oil supply, but we have to do something, and that's my feeling. The OPEC ability to do what they can do, to my mind, disrupts our concepts of free markets and choices, and we have to have a versatile approach to the problem.

Senator RIEGLE. Before yielding to Senator Lugar, let me make just one comment. And that is: In response to the article Senator Proxmire mentioned, it seems to me that a 31-year turnaround time to 2010, if that's what we had to work with, I am sure we could all go back to the drawing boards and come up with ideas we like better.

I think the immediacy of this problem and the strategic aspect of it financially, economically, militarily, in terms of holding the social fabric of the country together, and other things, are underscoring the point that I think you made earlier, Mr. Cutler, and that is: In terms of why the private market can't be expected to get this job done in the time frame we need.

The elements of risk go beyond just the economic, it goes beyond the political risk assessment or whatever. But it's a different kind of problem. Therefore, I think we are pushed into looking for alternatives that are fast ones. The great attractiveness of this is we know how to do it, and that it's essentially an on-the-shelf item that we can make available to ourselves if we decide there's a need.

PEOPLE WILL ACCEPT SACRIFICES

The thing I might also say that worries me more than anything else is that people will accept sacrifices in the short run if they have the feeling that something constructive is under way. But if we're not going to move to push this problem back, then I think we get caught in all the backfire. Who do we blame? Do we blame Schlesinger because he can't run the Energy Department? Do we blame the Congress because Carter is too involved with foreign policy, et cetera? And that leads to nowhere. That's just not the exercise we can afford to stay in.

We have got to be in the exercise of figuring out how we solve the problem, and that's why I think this particular notion has a spontaneous support of its own.

I was asked by a reporter a minute ago when I was out of the room, "Why is it that suddenly this thing is perking here, there, and other places at once?"

And my own sense to that is because we have got a lot of serious people who are extremely worried about where we are and practical people starting to look for practical solutions to serious problems. There are not a lot of choices. And this is one; it's a realistic one, and I think that's why we've got people like yourselves not only interested in it, but willing to come and testify with conviction about it—because you know this is something that can be done and will help the situation.

Senator Lugar.

Senator LUGAR. Senator, I won't detain you long. I want to followup just briefly a couple of points that were developed by Senator Proxmire when he was talking about the budgetary costs and then he mentioned balancing the budget and its desirability.

It appears to me that one of the reasons why the production supply side strategy that you are suggesting is tremendously important is that you try to explore all of this, if we really explore the other side, that we don't have adequate energy in the country, then it becomes inordinately expensive.

Mr. Rohatyn mentioned the possibility of a severe recession, and I suspect each of you gentlemen would likewise concur, if there is inadequate energy supply and what is already inadequate is already expensive, that full employment in approximating that general goal of our economy is going to be very hard to come by.

I think, as a matter of commonsense we all see that, although that has been unstated, and I think it's tremendously important. On other days in this committee, we would all be very excited about the implications of anything you were doing with regard to full employment, jobs for Americans. Preventing unemployment has been a major facet.

As we take a look at this, the failure, it seems to me, to provide this additional synthetic fuel means unemployment. Really, ultimately, massive unemployment. Is this a misreading or is there any way to get around unemployment unless we have synthetic fuel?

Mr. ROHATYN. Senator, I think I indicated at the beginning of my testimony that I thought this was probably the most exciting industrial opportunity for this country in a long, long time. And I think that's basically it. I think that you cannot go on with the kind of structural unemployment that you have today and that you're going to be facing in a recession. And you can't really compute what your budgetary costs might be here, unless you factor in the employment that you create, the taxes that you generate, and the reduction in your inflation rate as a result of reduced oil imports at astronomical rates.

So, I am absolutely with Lloyd and his colleagues. I think there is clearly a risk in it, but I think it will turn out to be one of the greatest investments this country can make in terms of its security and social structure.

Senator LUGAR. I think that's very important testimony because I can see, coming from a hearing such as this, a report that "Today, distinguished Americans suggested that the Federal Government spend \$100 billion, maybe \$200 billion." That sort of implies the "last of the big-time spenders moving off into the economy."

Senator Proxmire says you throw money at problems, we throw money at education, throw money at cities, and willy-nilly we are now about to throw it at energy with maybe about the same disastrous result he suggested has occurred in education and the cities.

Leaving aside whether that is a fair judgment as to what has occurred in education or the cities, that still sort of left hanging around here that we are throwing money at energy in this way, unbalancing the budget.

Now, the other side of the coin: If we were, as I say, in another hearing on a different day, the purpose would be to examine what it means to have millions of Americans unemployed, gross national product in decline, a recession very deep, and at that stage, of course, the costs are enormous. It is suggested, even in this coming fiscal year if we miss the mark, as opposed to a budget deficit in the 1930's, it would be 1940's, 1950's, 1960's. And at that point, we say essentially, that's just the way the ball bounces. There are

entitlement programs out there, trigger mechanisms, all of which come into being.

Now, in this instance, it seems to me if you're saying this—and if you're not, why, correct me—that we're going to make a calculated investment as a government and as private industry; the reason we're doing it in this form is because there are risks and they are market risks, in part, but, I think, much more completely the environmental risks or the governmental regulation or foreign risks that we have talked about.

I don't know of a rational businessman in this country that would approach a large energy project facing the gauntlet of governmental restrictions, and environmental hazards. There simply isn't that much money and time in the world to make that kind of risk.

It's all well and good to talk about private enterprise, but in the energy area we haven't had that for a long time. It seems to me, without a program in which there is governmental clout to break the bottleneck, to force the President to make decisions, to move on. Whether a strictly private sector initiative was a good idea or not, it would never get off the ground.

DOE PEOPLE ARE REGULATORS, NOT PRODUCERS

One good reason for having the Government as a partner is to try to get decisions and even that might not guarantee results. The fundamental point you have added to this debate is that if the Government is needed to do the block and tackle work, private management is needed to get the job done.

I think you are absolutely correct. If the Department of Energy handled this, nothing would occur; there would be no further production whatsoever. The DOE people are regulators, not producers, and it's important to make a distinction between the two.

And I simply want to take this opportunity to try at least to frame a part of our hearing record in a way in which it is clear why we are headed in this direction. It's not a denial of free enterprise or that we are busting the budget or any of these dire consequences, but rather we expect, in order to have full employment in the country, to have a growing gross national product; as a matter of fact, to have any hope of producing anything, we have to get through the environmental hazards, through the rocks and shoals of that and move onward toward greater energy production.

Senator RIEGLE. Would you just yield at that point? Because I tend to feel much the same way on this matter. I would like to add just one or two things.

I think we get from this approach what is really important to recognize, and also ought to be in the record, and that is that I think we're talking about a project here and potential gains that are truly in the broad public interest, and they are gains that would belong to the public and private sector together.

In other words, this kind of an over-averaging requirement, I think needs to be thought of in those terms. It's not one part of the society and one part of the structure as against the other. This is something that is really, truly a common interest.

I think, second, by having a consortium, a team effort where government and the private sector work together intelligently and effectively, under time pressure and with good faith, that you can then attract the managerial talent. To get competent people to run this operation is absolutely key to its success.

I thought, myself, in the last few days, I am not sure what luck the administration is going to have, for example, in replacing Barry Bosworth. And I worry about that. I think, by setting this thing up on this novel basis, consortium effort to public-private ownership, you can then get the talent and the managerial wherewithal to actually meet tough deadlines.

I think you can deliver and you can program. I think that's an essential part of this thing. I might say that we, Senator Lugar and I, got together the other day in another program area directly relevant to this, and that's in the Economic Development Administration area, where in the cities area we're finding that we get more done faster and more cost-effectively if we have got a public-private combination, rather than leaving it all to either party.

So, we are breaking some new ground in terms of concepts. There are other parallels we can look at. I think that, too, is a critical aspect and a guarantee that the public has, that the situation is on the level, and they have a stake in it. This is something that really belongs to everybody and not just to somebody.

Senator LUGAR. I appreciate your comment. And I have no further question, unless you have comments excited by any of this.

OVERSIGHT AND PROPER GOVERNMENT ROLE IS NEEDED

Mr. IGNATIUS. Yes. These last points are terribly important, and the concept of this corporation is vital to the success of a program of this kind. We would hope it would be a relatively small staff. We would hope that this could be a relatively small organization. Unless it's done that way, obstacles would be placed in the path of private industry that ultimately has to do this. Rather than that, encouragement, with proper government oversight and the proper government role being played, is needed.

We're talking urgent schedules. The United States is very good at meeting urgent schedules. We have done it many times in our history; we can do it again. It's often involved forward looking people in the Government and forward looking concepts. But when we make up our mind to do something on a large scale in this country, our record of doing it is very good.

The need for it exists today. The ways we talked about doing it, we think are proven and practical, and the time to get on with it is now.

Senator LUGAR. We are very grateful for your testimony.

Mr. CUTLER. I would like to add, if I could, in addition to thanking you both for what you have said, that this should not be understood as throwing money at a problem in a sense that perhaps engendered Senator Jackson's bill, throwing money at a project that you never get back.

This is essentially a proposal that the Government decides on a goal and create a structure for achieving that goal. The Government will have to take risks to do that. There are financial risks,

and there will be other risks. But it may, in the end, cost the Government no money at all. Money is not the important thing here. It is the taking of a risk and the decision that we are going to do something despite that risk.

And one of our poorest, one of our worst skills, is making up our minds to do something. When you said earlier that the Secretary of Energy can't run this program, neither can the 500 of you, with all due respect. All you can do is point us in a direction, create a structure, and say, "Go to it."

Senator RIEGLE. Well, let me say two or three things very briefly, and then we will close.

First, there will probably be some followup questions that we would like to ask you to respond to for the record. And I think some of the other committee members may have some they may want to submit on that basis, too.

I want to thank you very much for your time and testimony and your thoughtfulness today. But more than that, I want to thank you for the strategy and effort that each of you is expressing on a profound public issue that falls outside, probably, in many respects, the normal scope of your professional work. I think your example today, in terms of the thought and time that's gone into this, and the commitment, the feeling and analysis that you bring to this question, this important public question, I think, is exactly what we need more of if we are going to break the larger logjam of pulling the country together, developing a consensus, making decisions, and getting things done.

So, I think your personal examples in coming today and being active leaders on a broad public issue that's bigger than your own professional discipline, is a very important item by itself, and free standing. It's one that I appreciate, and I think everyone else will think about it and will also appreciate it.

So, thank you again, and we will stay in touch with you on these matters.

The hearing is adjourned.

[Whereupon, at 12:40 p.m., the hearing was adjourned.]

[Additional material received for the record follows:]

COMPTROLLER GENERAL OF THE UNITED STATES

Washington, D.C., July 12, 1979.

Hon. WILLIAM PROXMIRE,
Chairman, Committee on Banking, Housing, and Urban Affairs,
U.S. Senate.

DEAR MR. CHAIRMAN: As requested by your staff, we are transmitting a copy of an analysis by GAO's Energy and Minerals Division of a proposal to produce synthetic fuels. The proposal was developed by Messrs. Paul Ignatius, Eugene Zuckert, and Lloyd Cutler.

Mr. Ignatius gave me a copy of the paper sometime ago. Because I considered it an important proposal deserving careful consideration, I asked for a staff analysis and forwarded a copy of the analysis to Mr. Ignatius in June 1979.

I should point out that this represents initial observations which could change as further study is made of this and similar proposals. These constitute important proposals to deal with the Nation's energy problem and deserve careful consideration. We hope that the enclosed analysis will be helpful in assisting the Committee in its deliberations.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

Enclosure

COMMENTS ON A PROPOSAL BY MESSRS. PAUL IGNATIUS, EUGENE ZUCKERT, AND LLOYD CUTLER TO PROVIDE UP TO FIVE MILLION BARRELS OF FUEL PER DAY FROM SUBSTITUTE SOURCES

SUMMARY

The authors' proposal is to create a synthetic fuels industry capable of producing 5 million barrels per day from sources such as shale, tar sands, heavy oils, coal, and farm crops. The purpose of the plan is to counteract the growing U.S. vulnerability to OPEC price and supply decisions.

Generally, we agree with the authors' perception of the problem. Our analysis of domestic supply trends has led us to expect a continued decline of domestic oil and gas production. There certain is the possibility that a very serious shortage of liquid fuels will begin in the next 5 to 6 years as the authors state, and this would be felt most severely in the transportation sector where there are virtually no substitutes available.

A crash program may be what is necessary, but our quick review of this proposal leads us to conclude that it would accomplish far less than is expected within this timeframe, probably on the order of one or two million barrels per day, and would cost much more. The cost would be reflected not only in dollar terms but also in adverse environmental effects. While a program similar to the attached may very well be the way to go, there are many questions that would have to be answered and issues discussed before we could endorse this specific proposal.

Furthermore, the production of synthetic fuels is not the only way to deal with the energy supply problem. Conservation and renewable energy sources are two others which are not included in the proposal. Any crash program probably should also include these measures. For this purpose, we would define conservation as energy efficiency improvements, and renewables as the technologically ready renewables which are being kept off the market for the same economic reasons as the synthetic fuels are being kept off the market.

We also feel that a program which included conservation and renewables as well as synthetic fuels would have better balance and would be easier to implement from a public policy viewpoint. There is widespread skepticism by the public and the Congress about the energy problem. Any expensive plan will have a very difficult time in obtaining approval even if it were to have wide agreement and support from the energy policy community.

There are three main reasons why we are doubtful that the synthetic fuels proposal could accomplish the stated objective of five million barrels per day in the next 5 to 6 years. Firstly, the proposal discusses the means for acquiring only the new plants which would process the synthetic fuels. It neglects to discuss the infrastructure that would have to be expanded to provide the necessary feedstock to the plants from coal, shale, etc. This is not a small undertaking. For example, coal would probably require the least amount of effort since it is a more concentrated fuel source than shale or other options. But even if the feedstocks were to come entirely from coal, it would require more than a doubling of our present coal industry to support synthetic fuels production of five million barrels per day. It is doubtful that this could be accomplished in just a few years.

Secondly, there are potential problems in water availability. Many of the feedstocks are located in arid or semi-arid areas. Whether these areas could *ever* support a large synthetic fuels industry is open to question. This is a question that has been frequently raised but has yet to be solved or even attacked directly. For the present it is considered to be "tomorrow's problem" since we are still developing the technology to operate the plants themselves, but it may turn out that expensive measures will have to be taken to transport either water from other parts of the country to locations where the feedstocks are, or transport the feedstocks to where the water is. Obviously, the expense of either of these measures will be high.

Finally, we are not as sanguine as the authors about the readiness of the technology for synthetic fuels. While some of the technologies are undoubtedly ready, there are areas of uncertainty. For example, we have heard that synthetic oil made from coal or shale could not be processed in existing refineries; and since it has never been done before, no one is quite sure whether we know how to modify refineries for this purpose, or whether it could even be possible, considering the different chemical composition of coal and oil.

The issue of cost is, of course, highly conjectural at such an early stage of any proposal and the authors recognize this. They have suggested a rough estimate of \$50 billion to produce five million barrels per day. We have also done some rough calculations. Our calculations indicate that five million barrels per day would require over 100 synthetic fuel plants which would cost more on the order of \$90 billion. These estimates do not include costs associated with providing the feedstocks

for the plants such as doubling the coal industry. This raises the related question of how much of a free hand would we, as a society, be willing to give to the management of the proposed Petroleum Corporation. During World War II, we may have given a great degree of fiscal latitude to those who were developing synthetic rubber and making aluminium. Are we willing to do the same with energy in this time of greater concern with government spending and inflation, as well as the widespread mistrust of government and business?

In addition to the issue of fiscal latitude, there is also the parallel concern with environmental issues. Are we willing to pay the cost of environmental degradation to develop synthetic fuels on a crash basis or will we require that such a program be attempted within strict environmental regulations?

The environmental question is another reason why we support the concept of a more balanced approach which would include conservation and renewable measures. Most of these measures are more environmentally benign than the production of synthetic fuels. The implementation on a crash basis of energy efficiency improvements, through means such as a 100% tax credit for insulation, and similar measures for the technologically ready renewables, such as some solar options, might produce the equivalent of a significant amount of synthetic fuels at lower costs. This would have to be studied further.

Finally, on the question of financing a crash program, the authors refer to the possibility of securing funds from the proposed windfall profits tax. We agree with this and note that there are additional possibilities if the windfall profits tax is not sufficient. One is a direct tax on current energy use, under the concept that it is reasonable to expect to pay for the development of tomorrow's energy through today's use. Two others would be a reprogramming of funds from current programs in the Department of Energy and the Department of Defense—the Department of Energy because such a crash program would probably overlap and make obsolete or unnecessary a number of existing programs being undertaken with lower priority, and the DOD because one of the main reasons for undertaking the crash program is to protect our National security, so that it may not be unreasonable to expect the national security budget to share in the cost of this undertaking.

Apropos of this national security theme we would note the overwhelming (39-1) passage in early May by the full House Banking Committee of H.R. 3930. This bill would authorize the President to let contracts for the construction or modification of plants to make synthetic fuels or feedstocks for the armed forces, or for the purchase of such products, up to a limit of 500,000 barrels/day of oil equivalent, a limit set in relation to our total military fuel requirements.

THE PROBLEM

Our analysis of domestic supply trends has led us to expect a continued decline of domestic oil and gas output, which would worsen the major concerns we already have regarding dependence on oil imports:

The dollar drain, with its damaging effects on our international financial position and resultant exportation of employment,

The vulnerability of major parts of our society to disruptions arising from arbitrary actions by petroleum exporters,

The constraints on our international actions which might be applied by countries upon which we are dependent for oil imports.

We would note, however, that there is widespread public doubt about the reality of the current energy problem, and even greater skepticism, in the public and Congress, about the frequent statements pointing to a more severe global crisis arising from the peaking-out and decline of world oil output projected to begin in the 1985 to 1995 time window. Therefore, this plan, or any other large-scale program to improve U.S. fuel supplies in the next five to ten years, will have a very difficult time obtaining approval, even if it were to have wide agreement and support from the energy policy community.

THE NEED FOR A CRASH PROGRAM

In our analysis of the Administration's 1977 energy plan, we projected that U.S. oil imports would continue to increase to a level of 12 or 13 million barrels per day in 1985. If it is agreed that such a future level of imports is intolerable, (and, for that matter, that the present level of about 8 million barrels per day is also unacceptably dangerous) then it is correct that major actions are called for. However, we question the approach of this plan, which relies entirely upon stimulation of supplies of substitute fuels. We think that a program which included incentives to

deployment of solar and conservation technologies, as well as synthetic liquid fuels, could likely produce the same import reduction at least overall cost.

Furthermore, we have serious doubts about the feasibility of the plan. We will address this issue first, then turn to a discussion of a more balanced program and its financing.

There are three issues which must be clarified to put the plan in proper perspective. These are:

Physical and technological limitations, which we believe will constrain such an approach to substantially smaller levels than the 5 million barrels per day by 1985 which it speaks of

Cost estimates, which are substantially higher than those mentioned in the plan

Problems which would have to be resolved, and social and environmental impacts which would have to be accepted, to accomplish even a major part of the plan.

PHYSICAL LIMITATIONS

Feedstocks and infrastructure

The authors' plan treats the processing plants which would be needed to make substitute fuels, but does not take into account the task of extracting and moving massive amounts of material for these processes.

Taking a favorable example, it would require about 840 million tons of coal per year to provide feedstock for plants to produce 5 million barrels per day of oil equivalent in synthetic fuels. Oil shale and tar sands have only a fraction of the energy content of coal on a weight basis, so the feed requirements for such plants would be several times greater than for those fueled with coal.

For a comparison, the U.S. coal industry is now extracting about 700 million tons per year, and so would have to more than double in six years to meet this demand. Yet a just-released OTA estimate is that our coal industry in the year 2000 is likely to reach a capacity of between 1,500 and 2,100 million tons, i.e., only doubling or tripling in two decades. We are not prepared now to make a firm estimate of the feed-handling capacity that could be attained by 1985, but we feel that the availability of mining and handling equipment and skilled workers would set limits significantly below the levels required for the authors' plan. And it would be little value to have processing plants available without sources of feedstock.

Water availability

Another physical limit, likely to constrain a synfuels program to a magnitude smaller than that mentioned in the authors' plan, is that most of the proposed synfuel technologies require substantial amounts of process water, yet they would take place in the water-short semi-arid Western states. It is true that oil shale located in the Southeastern or Midwestern states would not encounter this limit, but it is our understanding that the reason for the focus on Rocky Mountain shale in previous studies is that it has a higher energy content than other shales, and so would involve smaller volumes of material to be processed. We have already noted that even the best grades of shale have substantially lower energy content than coal.

Readiness of technology

The plan would, it is argued, be based on today's technology. We are not as optimistic about the current state of technology as the authors.

For example, we have been told that synthetic crude oil made from coal or shale could not be processed in existing refineries, and that refinery modification to accommodate those feedstocks is not a matter of using off-the-shelf technology as, for instance, can be done to modify current refineries for greater outputs of unleaded gasoline. Rather, an extensive R&D program would be needed before shale oil feedstocks could be used, and syncrude from coal is likely to be incompatible with current refineries because of the profoundly different proportions of hydrogen and carbon in coal, as contrasted to petroleum.

The SASOL process, now in use and beginning expansion in South Africa, as we understand it, does not feed its product to regular refineries, but makes a gasoline substitute directly. However, the existing plan has an output of only about 6,000 barrels per day and the cost for its product, while not well known, is estimated in the range of \$30 per barrel or more.

With regard to substitute fuels from biomass which would not compete for land with food crops, there are some promising alternatives worth exploring. These include plants which have a hydrocarbon sap that could be extracted and possibly processed to yield liquid fuel, and which can grow on semi-arid land not now used for food crops. However, extensive research work would be required to breed new varieties of these plants with a yield high enough to make such a process give useful

quantities of fuel. Thus, such a potential resource can be seen as a worthwhile research gamble, as suggested by Resources of the Future's President, Charles Hitch, not as a technology which is anywhere near readiness for deployment.

Synthetic fuel technologies which do seem ready for major deployment are primarily ones for making gaseous, not liquid fuels. These include a high BTU substitute for pipeline quality natural gas, or a medium BTU gas which could be used as a boiler fuel and for some industrial uses, both made from coal. The liquid fuel sources from coal and shale have been discussed above. While alcohol production from crops is an available technology, it would be limited by the competition with food requirements and has also been challenged as requiring more fuel to cultivate the crops, using existing farming technology, than could be obtained from them.

We would note, however, that alcohol from crops could be used to enhance the octane ratings of gasoline, where its value would be greater than its energy content.

In addition to the question of whether these technologies are actually ready for deployment, we would question the technical feasibility of building such plants within the time called for in the authors' plan.

Taking a plant size chosen in a recent survey of cost estimates, one producing fuel with an energy content of 250 billion BTUs per day, or the equivalent of 43,100 barrels of oil per day, the production of five million barrels per day of fuel would require 116 plants. Whether built as large single units or in smaller modules, the manufacture of major components such as pressure vessels for these plants would severely strain the capacity of U.S. equipment manufacturers, and could encounter the kind of backlogs that forced the Canadian tar sands plant to have to order its pressure vessel from Europe, and still wait several years to obtain it. If these components were to be obtained by assigning wartime first priority to their manufacture, we would have to ask what other projects would be delayed to allow the fuel plants to be rushed to completion.

COST ESTIMATES

The plan makes a rough estimate of \$50 billion for capital costs for a program to deliver 5 million barrels per day of substitute fuels.

Other cost estimates

A comparison has just been published¹ of the various estimates which have been made recently for the capital cost of plants to produce alternate fuels. In this comparison, it is noted that some of the cost estimates may be low because they may exclude certain components of capital cost, such as land costs, interest during construction, and treating of products, also that older estimates are lower than current ones even after adjustment for what we assume is inflation. With these caveats noted, however, we can compute the average costs estimated for different types of plants as shown in Table 1.

TABLE 1

Type of Product	Estimated cost for	
	Single plant ¹ [millions]	116 Plants ² [billions]
Heavy fuel or syncrude.....	\$557	\$64.5
Medium and low BTU gas.....	587	68.1
Gasoline or light fuel liquids.....	913	106
High BTU gas.....	975	113
Average.....	758	87.9

¹ Output of 250 billion BTU per day, equivalent to 43,100 barrels per day of oil (b/d).

² Number of plants to produce 5 million b/d.

Source: Survey of publications between 1973 and 1978 summarized in *Oil and Gas Journal*, Apr. 16, 1979, page 91.

The overall cost for a 5 million barrel/day program, taking an average of the four types of plants considered, is \$88 billion.

Our experience in viewing cost estimates for new types of facilities leads us to regard this as a lower limit. There is a long and distinguished record showing that first ventures into all sorts of large new engineering projects end up costing sub-

¹ *Oil and Gas Journal*, Apr. 16, 1979, page 91.

stantially more than is estimated at starting time, (and also taking longer than anticipated to complete).

Costs in addition to processing plants

The plan does not include cost estimates for facilities that would be required in addition to the processing plants. Leading among these, in our view, would be the extraction operations, either coal, shale or tar sand mines, or farms.

We have noted that the plan would require extracting about 840 million tons per year of coal, or several times larger amounts of shale or tar sand. Estimating the capital costs for setting up operations of this scale can be done fairly accurately for coal. As of 1975, investment requirements for 5 million tons a year of coal capacity were estimated at \$42.3 million for an underground mine, and \$36.7 million for a surface mine, in one study which we reviewed. More recent work, cited by OTA in a newly released report, gives estimates several times higher, but includes some cleaning operations that would not be needed for synfuel operations. Using the more conservative number and inflating to 1979 dollars, we get an estimate of \$50.9 million for five million tons per year, or \$8.6 billion for the entire program. Capital costs for establishing much larger extraction industries for shale or tar sands are likely to be greater.

Combining the estimate for average processing plant capital cost with the estimates for coal mine capital cost leads us to a *lower limit* cost estimate for the 5 million barrel per day program of about \$96.5 billion, approximately twice that mentioned in the plan.

PROBLEMS AND IMPACTS

Public acceptability

We have already noted the problem which would come first in attempting to carry out such a plan—the doubt by many that it is necessary.

In a briefing we gave recently to the senior energy staff member for a leading Senator, we were told that they fully expect world oil supply to continue to increase well beyond the limits currently being discussed. It is their view that U.S. financial participation in oil and gas exploration and development in non-OPEC countries could provide us secure imports during and beyond the five to ten year span at which the plan is aimed. Reasoned views of this kind, no matter whether they have wide political support or only a few influential backers, when combined with wide distrust of the energy industries, particularly of the oil companies and utilities and their related construction firms, combine to make such plans extremely difficult to launch. We are reminded here of the response to the late Vice President Rockefeller's \$100 billion "Energy Independence Authority" proposal, which did not reach the point of serious consideration in the Congress.

Environmental regulations

There is major opposition to most energy supply projects from local interests which would be harmed by them and by both local and national environmentalist groups. Recent set-asides of Alaskan lands for nondevelopment uses such as wilderness and wildlife preserves, regarded as a victory by environmental groups, may conflict with the future expansion of Alaskan oil and gas output. Coal development and use have to meet more stringent standards for land reclamation from mining and air quality degradation from burning than prevailed before the 1970s. These and similar standards are certain to present problems and delays to an accelerated development approach such as that proposed in the plan.

Actual operation of the plants and their associated extraction industries will have environmental impacts which, in most cases, could be quite substantial at this time. The Assistant Secretary for Environment of the Department of Energy has just released a report, "Environmental Readiness of Emerging Energy Technologies," which summarizes her Office's assessments of 24 technologies, grouping them into three classes with increasing probability, at this time, of adverse environmental impacts. Of the technologies under discussion in the plan three, coal liquefaction and gasification and in situ oil shale recovery, are classed as having relatively high probability of adverse environmental impacts, and two others, fuels from biomass and surface retorting of oil shale, are classed as having low-to-medium probability of serious detrimental environmental impacts. None of the substitute fuel technologies are placed in the report's least problematic class, which is characterized as likely to produce net environmental benefits when substituted for older technologies. The implication which we see in this classification is that a crash program launched immediately, to bring 5 million barrels per day of capacity into operation, offers a good chance to realize the prediction made informally by an energy analyst from

one futures research organization, that "Sooner or later we will have to sacrifice a few counties of the Rocky Mountains for energy."

Additional problems of an institutional rather than environmental nature would include the socio-economic issues raised by accelerated growth of energy "boom towns", and competitive struggles typified by the battle between railroads and coal slurry pipeline developers over pipelines seeking routes crossing railroad rights-of-way.

DISCUSSION

We have explained why we doubt that this plan could meet its target, and given a rough sense of what we think its costs and impacts would be, in addition to the reasons why it would be unlikely to get the support necessary to launch it. This has not been meant, however, as an expression of opposition in principle. A more realistic target, of possibly one or two million barrels of oil per day, could more likely be achievable and should certainly merit serious consideration.

A balanced program

However, we do regard the plan as unbalanced, in the same way that we viewed the 1976 synfuels commercialization program. A crash program involving major governmental support for deployment of technically ready renewable resource and conservation (in the sense of increased efficiency) technologies, as well as the substitute liquid fuel supply technologies, would appear to be a more balanced approach. The dismissal of conservation measures outlined in the President's April 5, 1979, program, which was a short list that most conservation and solar advocates found seriously wanting.

The plan would have the government support the deployment of substitute fuel supply technologies which will yield product more expensive than present world oil prices, and even subsidize the difference between their cost and future world oil prices. On the same basis, surely the government should also consider subsidizing the deployment of conservation and solar technologies, at least to the extent that they can displace, and thereby reduce imports of, high grade fuels at costs equal to the future world price of oil.

We would add here that, in contrast to the supply technologies, many efficiency-improving conservation initiatives and solar technologies are classed, by the DOE Environmental Readiness report, as likely to result in net environmental benefits, and most of the others are classed as having only low-to-medium probability of serious detrimental environmental impacts. Also, many of the conservation and solar initiatives would come in relatively small scale units and be widely distributed, which would involve many more of our citizens in the psychological lift of "doing something" which is cited as a desirable result of the plan. In our view, this wide participation could also contribute importantly to allaying the popular distrust of major energy companies and their apparent dominant role in most of our energy system.

Financing the program

The plan notes that the proposed windfall profit tax accompanying oil price deregulation could logically be recycled to finance the government's costs in a substitute fuel supply program. The same can, of course, be said for financing a conservation and solar subsidy program.

Additional financing could come from direct taxation of current energy use, based on the concept that present energy users should contribute to guaranteeing the reliability of their future supplies. This is the logic behind the extremely high taxes on motor fuels in most other developed countries, which make gasoline prices there on the order of \$2 per gallon, double the \$1 per gallon toward which our gasoline prices are only now rising.

Parts of the Department of Energy budget are now devoted to systematic research and development work, and some demonstration projects, on the technologies discussed in this program. If accelerated deployment efforts were to be undertaken, the R, D and D spending would probably appropriately be diverted to provide a share of the Government's funding of the program.

Another major funding source which we believe merits consideration would be reprogramming of a significant fraction of our national security budget. We suggest that this approach should be taken just as seriously as we take the contention that our present and anticipated oil import dependence represents a risk to our security.

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, D.C., July 11, 1979.

Mr. PAUL R. IGNATIUS
President, Air Transport Association
Washington, D.C.

DEAR MR. IGNATIUS: Thank you for your appearance at the recent Economic Stabilization Subcommittee hearings on synthetic fuels production. The discussion was most interesting, and I believe that a useful record was developed.

Enclosed is a list of several additional questions to be included in the record of these hearings. I would appreciate it if you could provide written answers to these questions no later than July 25.

Again, thank you for your very interesting testimony.

Sincerely,

WILLIAM PROXMIRE,
Chairman.

Enclosure.

HEARING ON SYNTHETIC FUEL PRODUCTION

ADDITIONAL QUESTIONS FOR THE RECORD

1. Your proposal contemplates the possibility that a U.S. synfuel program could moderate OPEC price increases or actually lead to a price reduction. Given the enormous leadtime before synfuel production rates would be significant, the comparatively minor contribution even a fully developed synfuels industry would make to U.S. energy needs, and the likelihood that synfuels production would carry a higher cost than oil imports, isn't it as likely that OPEC would raise their prices to the synfuel price level?

2. Given that a significant amount of the uncommitted coal resources, all of the high-BTU oil shale, and most of the U.S. tar sands are located in the arid portions of the West, how practical is it to plan for significant synfuel development given the current lack of an industrial infrastructure (roadways, railroads, workforce, etc.), and the limited water resources? Do you contemplate that state and local governments will have a say in synfuel plant development and siting decisions?

3. In light of the fact that synthetic fuels production will be minimal over the short term regardless of the resources devoted to synfuel development, could you discuss the desirability of a crash program as compared to a more deliberate commercialization strategy. In this answer, please consider any relevant factors, including the following:

Ability of construction, mining, and railroad industries to accommodate simultaneous development of numerous synfuels plants and associated facilities;

Effect on economy of the diversion of manpower and supplies required for construction of plants and associated facilities;

Increased costs due to lack of "learning curve" on plant construction and operating techniques.

4. Please provide for the record the background material on your proposal discussed on page 85 of the hearings transcript.

WASHINGTON, D.C., July 24, 1979.

Hon. WILLIAM PROXMIRE,
Chairman, Economic Stabilization Subcommittee, Committee on Banking, Housing, and Urban Affairs U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: In your letter to me of July 11, 1979, you listed several additional questions to which you would like to have responses to be included in the record of your hearings on synthetic fuels production.

I am enclosing responses to your questions on behalf of my associates, Lloyd N. Cutler and Eugene M. Zuckert, and myself. For reference purposes, I am also enclosing your list of the additional questions.

We very much appreciate the opportunity to testify before the Economic Stabilization Subcommittee, and hope that our testimony as well as the enclosed additional responses will be helpful to you and the other committee members in your deliberations on this important matter.

Sincerely,

PAUL R. IGNATIUS.

Attachments—2.

HEARING ON SYNTHETIC FUEL PRODUCTION

RESPONSES TO ADDITIONAL QUESTIONS FOR THE RECORD

Question 1.

World oil prices will remain sensitive to the supply-demand ratio. As we saw after Iran, a 5 percent drop in supply (from a previous supply-demand balance) has resulted in price increases of 50 percent. The synfuel program would increase world supply by 1.6 percent for each million barrels per pay of synfuel. This is bound to have a dampening effect on what world prices would otherwise be. As for the high cost of synfuel, even if it turns out above the world price at the time, the difference between cost and world price could be covered by a subsidy, so that OPEC would have no room to raise world prices to synfuel's cost. This would be far cheaper than paying a higher price on all 60 million BPD of current world output. Bernard D. Nossiter's *Washington Post* article of July 22, 1979, explaining why a synfuels program provides leverage against ever-increasing OPEC oil prices, is attached for information.

Question 2.

Only a part of a synfuel program would rely on western shale and coal. There are large coal deposits and significant shale deposits in Appalachia and the Middle West, where water is plentiful and the infrastructure is already in place. State and local governments would, of course, have a full say in siting and licensing decisions, but some bottleneck-breaking mechanism at all levels of government would be required. The President's program and the Jackson and Domenici bills include such a mechanism.

Question 3.

The reasons why we should not wait for normal commercialization are twofold: (a) Since the lead times are so long, if we did wait until the commercial market attracted such projects, we would lose another 5 to 10 years before the new production would be available.

(b) Unless a bottleneck-breaking mechanism is in place, the commercial viability of any project will be threatened by the time delays needed to obtain the required permits and licenses and defend them in litigation.

Only the Government can resolve these problems, just as it did in World War II and in the Korean War.

As for the coal mining transport and learning curve problems, these will exist whenever the program is launched and whether the initiative is taken first by government or by private industry or by a joint venture of the two. The sooner we tackle them, the sooner they are likely to be solved.

Question 4.

In response to your questions about costs of the synthetic fuels program, we did not make detailed cost estimates nor have them prepared for us.

Our own estimate of \$25 to \$40 a barrel was based upon the range of published estimates supplemented by confirmation from sources we believe reliable.

For example, in connection with one of the early drafts of our program, we consulted Dr. John S. Foster, Jr., formerly Director of Defense Research and Engineering, now of TRW, Inc. and in charge of their energy programs. As a result of our conversations with Dr. Foster, we felt satisfied with our estimates of capital cost and cost per barrel. As a matter of interest, Dr. Foster later publicly proposed a 7.5 million barrel per day program by the year 2000 in which he used cost estimates at the low range or below ours.

In addition, we consulted Dr. Herman Gamson, a chemical engineer with extensive petroleum experience, now Vice President of Martin Marietta Aluminum. Dr. Gamson confirmed our range of cost figures. We have had substantially similar estimates from Dr. Chalmer Kirkbride, a chemical engineer with vast industrial and teaching experience; Dr. Kirkbride served as technical adviser to Dr. Robert C. Seamans, Jr. when the latter was head of the Energy Research and Development Agency (ERDA). Dr. Kirkbride has testified before the House Education and Labor Committee on the subject of a synthetic fuel program.

The wide range of costs we suggested (\$25 to \$40 a barrel) was chosen in the interest of conservatism and our recognition of the fact there are technological uncertainties in developing plants of commercial scale. We believe that the South African experience gives reassurance that the costs are within a reasonable range in relation to the price of imported fuel. You will recall that the South Africans built their first SASOL plant in 1955. In 1975 they decided to build an addition to the plant, doubling their capacity. In 1979 they contracted for two additional units

which in 1982 will give them a capacity of about 130,000 barrels a day, an impressive investment for a country with a population 12% of ours.

There is an important incidental attribute of the SASOL plants. According to the U.S. engineers who are constructing the plants and U.S. observers who have visited the plants, greatest care has been taken to achieve environmental acceptability that would meet U.S. standards.

Returning to the subject of our cost estimates, we believe it is not material that our projected costs do not seem competitive with the present posted price of oil. We believe that a synthetic fuel program must be undertaken as an insurance against oil price increases or interruption of supply. As far as price is concerned, the posted price is often mythical: there are reports of recent purchases in the spot market at \$40 a barrel which gives credence to Mr. Zuckert's statement at the hearing that there could be a \$50 per barrel price in 1990. Additionally, as Mr. Rohatyn testified, the present and projected balance of trade drains resulting from imported oil constitute a real threat to the solvency of our nation and its financial institutions.

Under these circumstances, competitive disadvantage for synthetic fuels, if one does exist in 1990, is warranted as an insurance premium against perils of important magnitude.

[From the Washington Post, July 22, 1979]

THE NEW SYNFUEL OFFENSIVE CAN WIN CARTER'S ENERGY WAR

(By Bernard D. Nossiter)

In the swirl of controversy surrounding President Carter's new energy plan, Bernard Nossiter, an experienced economics reporter, argues that Carter's crash program promises fundamental leverage for the United States against a future of ever-rising OPEC prices.

A good rule of thumb in judging economic policy holds that when the corporate heirs and assigns of John D. Rockefeller oppose any position, it is likely to benefit the public interest.

So for the uninstructed, a useful gauge of President Carter's oil program is the response of the great oil companies. Happily, their message is as clear and concerted as their pricing and output policies.

At the biggest of the big, chairman Clifton C. Garvin of Exxon (nee Jersey Standard) deplored "unjustified attacks" on his concern and its fellows. By no mean coincidence, chairman John E. Swearingen of Indiana Standard complained of "Mr. Carter's continued berating of the oil companies." Public relations men no doubt dissuaded them from a more frontal assault.

The better instructed will have observed that the new program—for all the obscurity in its presentation—appears to mark a serious and important shift in the president's approach. His emphasis has now turned smartly from curbing demand—turning off lights, turning down air conditioners and the like—to expanding supply outside the reach of the OPEC cartel and its oil company agents. This turn to non-cartelized supply—to the capture of the vast amounts of oil in shale rock, tar sands, heavy oil and other superabundant resources—represents a measure of economic and political wisdom that has been remarkably absent heretofore.

Not for the first time, most of the press missed the point and seized on the proposed barriers to imported crude as the centerpiece of Carter's plan. In fact, this is a tired piece of sociological lag. The industry persuaded Eisenhower to do this sort of thing more than 20 years ago in the name of national defense. The quotas, of course, simply protected and raised the price of domestic oil, much like those now in force for textiles and as other politically persuasive industries do.

By themselves, oil quotas will simply encourage Arab nations with few people and much oil to reduce further their own production, confident that the value of oil can enjoy only a one-way ride—up. When an oil "glut" threatened to crack the OPEC price in 1977-78, it was Saudi Arabia and its neighbors that painlessly cut back output to shore up price. It was this slash and not the fortuitous events in Iran that triggered the latest round of increases and the attendant gas lines.

The heart of the problem, then, is how to encourage the Saudis, their neighbors, and the collaborating companies who receive the bulk of the output to believe that oil under the sand is not foreordained to rise forever, that it might be worthwhile to bring it up sooner rather than later.

WHILE THE GETTING IS GOOD

The answer, buried in Carter's laundry list, is to convince them that a serious program has been launched to enlarge supply outside their joint control.

Carter's scheme—giving \$88 billion to a government Energy Corporation to tap the vast shale and tar sands resources—appears to fit the prescription. Even in an age of inflation, \$88 billion over 10 years is not a trifling sum. Sheik Yamani, who after all, went to the Harvard Business School and so can talk on equal terms with Chairman Garvin and the other three companies in the menage a quatre enjoying Saudi oil will get the point.

They must now consider that a program of this magnitude outside their reach—if it is seriously pursued—will not only produce more oil but at prices below the level they hope to see it rise to. (Nobody really knows the costs of these projects because they have not yet been attempted on a big enough scale by disinterested parties. The fact that the potential cost of shale oil is always quoted at a few dollars a barrel above the existing price of crude—regardless of where that price lies—is ground for suspicion at least.)

The threat of even a relatively modest amount of new, non-cartelized oil will spur thought in Riyadh and Rockefeller Plaza. As everybody knows, demand for oil is price-inelastic over a wide range. That is, the price can rise five times but demand will barely fall. The comforting feature in this is that inelasticity works two ways: A small increase in supply can force a substantial cut in price. It was just this that worried OPEC in 1977, and so the nations not in need of huge cash returns from oil adjusted supply accordingly—downward.

The deliberations of Yamani and Aramco, the corporate name for the menage, could alter their valuation, of oil in the ground. Years before a barrel of shale is extracted, production and even price policies of OPEC might change drastically. Fears of an increased, uncontrolled supply from resources that dwarf even the fabled crude of Araby could turn the price curve down and the supply curve up. The boys might decide it is better to get it while the getting is good.

To be sure, much could happen before the Carter program is realized. The oil companies do not lack for friends on Capitol Hill, as the weakened windfall profits bill demonstrates. The Energy Security Corporation could well become their creature, an Energy Department instead of a TVA. The companies, especially Indiana Standard, have already demonstrated their conspicuous lack of success in extracting shale oil. They have little or no interest in expanding supply outside their reach. Indeed, they own some portion of non-traditional oil sources, and have been peculiarly unsuccessful in exploiting them.

There is no special magic in entrusting a government with the exploitation of oil. The Norwegians do it well, the British less so and the Mexicans very well indeed—surviving an attempt by the great companies to throttle them in the '30s by nationalizing their fields. But at least to begin with, the Energy Security Corporation will not have a vested interest in failure, and that is something. It must be watched closely, however, lest—like the Mexicans, Norwegians and British—it develops an oil company mentality over time and comes to believe that the best price is a higher price.

Despite these caveats, it is clear that an important turn in thinking has been made in the White House. The economics of scarcity is making room for the economics of abundance, at least in speeches. This is an event that only shareholders in the great companies need regret.

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, D.C., July 11, 1979.

Mr. FELIX G. ROHATYN,
*Senior Partner, Lazard Freres & Co.,
New York, N.Y.*

DEAR MR. ROHATYN:

Thank you for your appearance at the recent Economic Stabilization Subcommittee hearings on synthetic fuels production. The discussion was most interesting, and I believe that a useful record was developed.

Enclosed is a list of several additional questions to be included in the record of these hearings. I would appreciate it if you could provide written answers to these questions no later than July 25.

Again, thank you for your very interesting testimony.

Sincerely,

WILLIAM PROXMIRE,
Chairman.

Enclosure.

HEARING ON SYNTHETIC FUEL PRODUCTION

ADDITIONAL QUESTIONS FOR THE RECORD

1. In your statement, you stress how the cost of your program to Americans and the effect on the domestic capital markets could be minimized by marketing bonds to foreign governments. However, you neglect to point out that this financial device would also involve costs. Would the 1.5 million barrel per day production not be reduced by an amount equal to the percentage of bonds owned by foreign governments? Would the foreign owners be permitted to participate in policymaking? Would they be expected to participate in any necessary production subsidies over and above the initial investment? What benefit would there be to the U.S. in creation of up to 750,000 barrels per day in synfuel capacity, with the accompanying environmental consequences, if this production were to be diverted overseas?

2. You propose a program in which the government builds synthetic fuels plants and then sells these plants to private contractors. If the cost of producing synthetic fuels remains above the price of OPEC oil, how would this program work? Would the plants be sold below cost? And would the government have to pay price subsidies to guarantee production? (If yes, how would the government finance these subsidies? If no, why would private contractors purchase and operate these plants.)

3. You suggest that \$55 billion in capital could fund \$100 billion in construction over 10 years through the sale of the first-generation plants and the reinvestment of the receipts. Given the number of years needed to bring a synthetic fuels plant on line, is 10 years a realistic time frame to design, build, test, operate, and sell the first-generation plants and also obligate funds for a second generation?

4. Isn't it possible that Federal government subsidies to the synthetic fuels industry would encourage OPEC to raise their price since such subsidies demonstrate a willingness to pay more for oil?

5. Would your proposed program provide any meaningful protection against OPEC actions, since, at today's rate of oil consumption, it would only provide 3.75 percent to 7.5 percent of our needs (depending on the percentage diverted to other partners)? Is it not likely that this program, like the North Slope production in Alaska, would simply compensate for the depletion of other domestic sources and leave our dependence on imported oil unchanged?

6. You limit inroads into capital markets to \$10 billion. But this is only one of many energy alternatives all of which would take enormous capital investment. Should we, in essence, be putting all our energy eggs in the synfuel basket? Or otherwise, are we really talking about a far larger market burden from energy financing?

7. You state that a government-owned synfuels corporation would be more "visibly accountable" than a government agency. In what way would this be true? What models of U.S. government-owned corporations do you rely on as examples of efficiency and accountability?

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