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ECONOMIC IMPACT OF PETROLEUM SHORTAGES

HEARINGS

BEFORE THE

SUBCOMMITTEE ON INTERNATIONAL ECONOMICS

OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

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TUESDAY, DECEMBER 11, 1973

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON INTERNATIONAL ECONOMICS
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 345, Cannon House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representative Reuss and Senator Proxmire.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; William A. Cox, Lucy A. Falcone, Sarah Jackson, Jerry J. Jasinowski, John R. Karlik, L. Douglas Lee, and Courtenay M. Slater, professional staff members; Michael J. Runde, administrative assistant; and Walter B. Laessig, minority counsel.

OPENING STATEMENT OF CHAIRMAN REUSS

Chairman REUSS. Good morning. The Subcommittee on International Economics of the Joint Economic Committee will be in session today for the commencement of three days of hearings on the economic impact of petroleum shortages here and abroad.

To date there has been no organized assessment of the impact of prospective oil shortages on the U.S. economy. Official estimates of the short-fall range between 2.5 and 3.5 million barrels a day or approximately 15 percent of our expected utilization. Some forecasters have predicted a near-zero growth in 1974 and unemployment rates in the coming months rising to more than 6 percent. Already we are seeing the first effects of the shortages—protests from truckers, layoffs by airlines, plant closings in petrochemicals. If we are to formulate policies now, we must determine the impact of the shortage on employment and growth, both for the economy as a whole and in specific industries and regions.

The conservation measures already announced are clearly not going to be sufficient. Gasoline consumption must be cut. Would coupon rationing or higher taxes be more effective? What consequences might these measures have on standards of living, including those of the poor? What measures are available to limit consumer use of heating oil and electricity?

The allocation programs for fuel oil and propane provide the beginning of a sound program to assure equitable distribution, but we need to develop more detailed priorities to make sure that we can protect as many jobs as possible. Regulations authorized by the Mandatory Allocation Act are expected soon. Will they go far enough?

What choices need to be made among industries if we are to keep the effects of shortages from snowballing into a major recession?

If there is a risk of a significant economic slowdown in 1974, what are the economic policies we should adopt now to ease the adjustment and to minimize economic dislocation?

Last summer we were already faced with the prospect of serious fuel oil shortages. The Arab oil embargo has made the situation critical, but it has also given the oil companies a scapegoat. In the future, would the oil companies' response to market forces provide supplies adequate to meet the growing demands?

This morning, two members of the administration, Mr. Herbert Stein, Chairman of the Council of Economic Advisers, and Mr. John C. Sawhill, formerly head of OMB's Division on Natural Resources and now designated to be Deputy to the new Energy Chief, William Simon, will testify. We will also hear from Ms. Anne P. Carter of the economics department at Brandeis University, who worked on input-output analysis for several years with Nobel laureate Wassily Leontief. Finally, Mr. George B. Hegeman of Arthur D. Little, Inc., will testify on the particular problems of the petrochemical industry.

We are always glad to have you here, Mr. Stein. Under the rules, and without objection, your statement will be received in full in the record, as will that of Mr. Sawhill and the other witnesses. You may proceed.

STATEMENT OF HON. HERBERT STEIN, CHAIRMAN, COUNCIL OF ECONOMIC ADVISERS

Mr. STEIN. I welcome the opportunity to appear here today to discuss the economic consequences of the energy crisis.

You may think I say this to all of the committees. But I specially welcome the entry of this committee into this subject because you are the economic analysis body of the Congress, and I think the subject clearly needs serious and overall economic anaylsis.

There have, of course, been hundreds of days of congressional hearings on aspects of this subject in the past few months and millions of words written about it—that's a rough estimate. Still there is a great need in the country for more information and understanding about the energy crisis and I hope that your hearings will help to meet this need.

While there is much about this subject that is unclear, one thing does seem clear. The energy situation will confront the country with serious dangers, difficulties, and uncertainties. The world is a dangerous, difficult, and uncertain place. If we ignore this, or try to act as if it were not true, we will not survive in such a world. We simply will not be able to protect everybody against pain, or to achieve everybody's ideal of equity in the distribution of that pain. If we insist on trying to achieve these impossibilities as the price of cooperation in the vital national effort to deal with the problem, we shall put our independence in jeopardy.

I receive a lot of mail from people who are appalled by my saying this, but I believe this is the thing to say.

The Government's effort will be to manage the difficult situation ahead in a way that makes its costs as little as possible. But these costs

will be serious if the embargo continues. Nothing I say here should be interpreted as signifying anything different. I do believe that some estimates of our prospects are unrealistically pessimistic. But it seems obvious to me that a 15- to 20-percent cut in our oil supply must have a serious effect. Our main concern at present, in my opinion, is not to argue about forecasts of these effects but to try to find out how to keep them as small as we can.

We have to deal simultaneously with two related conditions, one short run and one long run. The shortrun condition is the crisis caused by the Arab embargo on shipment of oil to the United States. Here we have two goals. We want to minimize the immediate loss of goods and services fairly directly provided by energy, such as heat, light, and personal transportation, but also of the vast array of other things whose supply is dependent on energy. How well we achieve this goal depends in part on how well we allocate the available supply of oil and other energy sources, because some uses of energy yield more output than others. Achievment of the goal depends also on bringing into use every potentially available bit of energy. The second shortrun goal is to avoid unnecessary concentration of the burden on particular individuals. One of the main implications of this is the importance of holding down unemployment. Many of the other adverse consequences of the energy shortage, such as colder houses or less auto driving, tend to be shared by large numbers of people, or at least policy can be devised for sharing them widely. However, unemployment is inevitably much more concentrated.

The longer run problem is the one that existed before the embargo and that will continue even after the embargo has been lifted. It is to make sure that we develop as quickly and efficiently as possible all economic supplies of energy from reliable sources. That is what Project Independence means. The longer run problem concentrates on the expansion of reliable supplies. However, reliable supplies of energy in 1980 will almost certainly be more expensive, relative to other things, than energy has been in the recent past. This will hold down consumption of energy compared to what it would have been at lower prices. The shorter run problem, on the other hand, is chiefly to allocate the available supply. Nevertheless, even in the short run some expansion of supply will be possible and it is essential to obtain it.

Estimates of the magnitude of the shortages are, of course, forecasts and subject to some uncertainty. The calculations which we at the Council of Economic Advisers have made about the economic impact of the shortage are based on estimates available last week. In the last few days there has been some information suggesting that the shortage may be smaller than we have thought. If so, that would certainly be good news and would call for some revision of the estimates presented here. However, we have not had sufficiently clear new estimates of the shortage to incorporate any in new estimates of the economic consequences, although we hope to amend our estimates later in the week.

The estimates of the shortage that we have worked with are as follows: For this purpose I refer to the first quarter of 1974, on the assumption of a continuing embargo. And, as far as we can see, the situation will be at least as tight in the first quarter as subsequently in 1974. Total demand for petroleum products is estimated at about 20 million

barrels a day, if the economy is rising above its 1973 level of output by 2.5 percent per annum. This estimate also assumes no change in prices of petroleum products from mid-1973 levels.

The demand would include about 300,000 barrels a day of military requirements—that is, incorporated in the 20 million—previously met from foreign sources but now expected to be met from domestic supplies. The estimated supply of petroleum products, from domestic sources, from imports and from inventory reduction, is 16.5 million barrels per day. The supply would have been 3.2 million barrels per day higher if there had been no Arab supply restrictions. Thus the shortage, which results from the embargo, would be about 3.5 million barrels a day, or about 17.5 percent of the estimated first quarter demand.

Although petroleum is the largest single source of energy in the United States, it still accounted for less than half of our use of energy in 1972. The shortage of the total supply of energy from all sources will be about 8 percent. The other sources of energy—natural gas, coal, hydropower and nuclear power—are not totally substitutable for petroleum. However, there are enough possibilities for substitution to make the calculation of the total energy shortage significant.

The economic effect of this shortage will depend on how it is distributed among the various uses of energy. Some uses of energy involve relatively little processing on their way to the final consumer. Thus crude oil which becomes home heating oil goes through a certain process of refining and transportation which would be common to any use of crude oil, but not much more than that, except for the home delivery. However, crude oil which becomes diesel fuel for running a railroad which carries coal to a steel mill which makes steel which is subsequently manufactured into an automobile which is sold by a dealer to a consumer is an essential element in a long chain of production and employment. To deprive a railroad of a barrel of diesel fuel will have much more severe effects on output and employment than to deprive a household of a barrel of heating oil.

Cutting private passenger car use of gasoline, at least down to a certain point, would also have relatively small effect on output and employment. There would, of course, be some indirect consequences. A reduction of private gasoline availability will reduce demand for many associated activities—automobiles, or at least large automobiles, auto repairs, motels, resorts and so on. But on the average the loss from this would be less than from cutting industrial uses or freight transportation.

One element in the administration's strategy for dealing with the shortage is to make the heaviest cuts in heating, including residential heating, and in gasoline consumption, especially private car use. There are, of course, limits to the possible extent of this. Home heating must not be reduced below a level essential for health; a certain proportion of private car use is necessary for getting people to work. On the other hand some industrial and commercial uses of energy

can be eliminated without serious effects on output and employment. So one cannot formulate a general principle that regardless of the extent of the shortage all energy cuts should come out of household heating and transportation. But in the particular circumstances we face, and given the fact that every act will be to some degree painful, we think that damage will be minimized if cuts come largely out of those uses.

If the cuts in private passenger car use of gasoline are to have their desired effect in avoiding energy cuts for industry we must reduce as far as possible the gasoline obtained from a barrel of crude oil and increase as far as possible the other products obtained from the barrel. The Government has taken a number of steps to achieve that, including a rearrangement of the relative prices of gasoline and other products to make production of gasoline less attractive.

Another element in the strategy is to convert from use of petroleum to use of other fuels. The Federal Energy Administration is working with a number of utilities that have recently converted from coal to oil for the generation of electricity to switch back. Another vital conversion is indirect. Many industries are set up to use either natural gas or petroleum, generally preferring gas at existing prices but using petroleum if the gas is not available. A cut in the use of natural gas for home heating will make more of it available for industry. That is why it is just as important to turn down thermostats in houses heated with gas—and the same applies to electricity—as in houses heated by oil.

An additional element in the strategy for dealing with the present crisis is to get all the increase in energy supply we can. That will not be much in the short run, but it will be something. We have asked for authority to extract oil from the Elk Hills petroleum reserve. We have asked Congress for authority to override State restrictions on oil production. We have asked Congress to remove ceilings on prices of additional supplies of natural gas, which will both get more gas produced and get more moved to where it is most needed. We expect that increases in other prices of energy will be helpful in achieving an expansion of supply.

With this view of the extent of the shortage and the basic strategy for dealing with it, we have tried to estimate the effects of the shortage on output and employment. These effects would come partly from the supply side and partly from the demand side. The main supply-side effects would be in the business of transporting and distributing gasoline and heating fuels. For other industries the chief effect would come from reductions of demand which are the indirect consequence of the shortage of gasoline. That is, there will be less demand for large cars, for tires, repair parts, certain tourist activities and so on. There would be some reduction in the supply of energy directly to industry but in the magnitudes we envisage this would not be a significant limit on the industrial output for two reasons. First, there is some room for conservation in industrial uses. Second, output lim-

itations from demand reduction and output limitations from inadequacy of energy supply are not additive. Thus, if the gasoline shortage reduces the demand for large cars and cuts total automobile output this will reduce the requirement of the automobile industry for energy, permitting diversion of some energy to other industries and preventing them from being cut back by a shortage of energy.

One must emphasize that in estimating how much demand for output will be cut back by the energy shortage one is operating now in the area of almost total ignorance. If we cut gasoline consumption 30 percent, to what extent will people economize on their usual trips around town and form carpools, saving their gasoline for the longer trips on which they patronize resorts and restaurants? If they reduce their expenditures on gasoline-related consumption will they increase their expenditures for other consumption? The net effects on business investment and on exports and imports are similarly difficult to appraise, at least until we see more reaction to the new situation.

Nevertheless, we did try to make reasonable guesses about how consumers and businesses would behave and to trace the repercussions through the economy. This process led to a range of estimates of the net effect on real output, the range reflecting different assumptions about the degree and speed of consumers' substitution of other purchases for their purchases of energy-related products. Our estimate is that the energy crisis would make the real GNP between 1 and 2 percent lower than it would otherwise have been. On this basis, the increase of real GNP between 1973 and 1974 would be in a range from a little under 1 percent to a little under 2 percent. We translate this into an increase of unemployment in 1974 by about 0.3 to 0.6 percentage points above what it would otherwise have been. We would not expect the unemployment rate at any time in 1974 to exceed 6 percent. These estimates, made in this way, seem to imply a painless process. Of course, that is not realistic. The estimates of output loss and employment loss summarized here in rather small numbers do not include problems for many individuals and businesses.

These results are rather similar to estimates made by other forecasters. I attach to my statement a table prepared by the Economic Research Department of RCA which neatly summarizes these forecasts. This table, I might point out, shows that among 15 to 20 forecasters that the average estimate of the increase in real GNP from 1974 over 1973 is now 1½ percent. When the estimates were made a month ago, before taking into account the energy crisis, the estimated average increase was 2½ percent, which indicates a reduction of about 1 percentage point in the estimated rise of the real GNP from 1973 to 1974 that may be attributed, mainly, at least, to the energy crisis.

[The table referred to above follows:]

1974: THE ARAB OIL EMBARGO LOWERS MOST REAL GROWTH FORECASTS AND RAISES INFLATION

	Percent change 1974 from 1973				1974 current dollars GNP (billions)	1974 unemployment rate (percent)
	Constant dollars GNP	GNP deflator	Current dollars consumer durables	Pre-tax corporate profits		
The Fair Model	[1] 3.5	[2] 4.7	[1] 6	(3)	$1,394	[2] 4.8
U.S. Trust	2.5	6.0	2	−5	1,400	5.3
Argus Research	2.3	5.9	1	[1] 3	1,395	5.3
Harris Trust	2.0	5.6	0	−4	1,387	5.3
RCA	1.9	6.3	3	0	1,394	5.6
Dean Witter	1.8	5.7	1	−2	1,381	5.7
Data Resources	1.6	6.2	1	−4	1,390	5.5
Drexel Burnham	1.6	5.6	−2	−4	1,381	5.5
A. G. Becker	1.5	6.3	−2	−4	1,389	4.5
Equitable Life	1.5	6.3	2	−6	1,385	5.6
Mellon Bank	1.5	5.5	[2] −3	[4] −10	1,374	5.5
Bankers Trust	1.3	6.0	2	−6	1,381	5.3
First National City Bank	1.3	5.3	(3)	(3)	1,372	5.6
Manufacturers Hanover Trust	1.2	5.7	2	−6	1,375	5.6
E. I. du Pont de Nemours	1.0	5.5	−2	−6	1,375	5.5
Council of Economic Advisers	1.0	(3)	(3)	(3)	(3)	(3)
Chase Econometrics	.8	5.6	0	−1	[2] 1,371	5.7
The Wharton Model	[2] .6	[1] 7.6	1	1	1,393	[1] 5.8
Scudder, Stevens and Clark	[2] .6	7.0	0	−6	1,386	5.6
Lionel D. Edie	[2] .6	6.2	[2] −3	[2] −10	1,374	5.6
Table mean	1.5	5.9	1	−4	1,384	5.4
Table mean last month	2.5	5.0	1	−2	1,385	5.2

[1] Highest forecast in column.
[2] Lowest forecast in column.
[3] Not available.
[4] Mellon Bank sample, not used in calculating table mean.
[5] Not more than 6 percent.

Note: Of the 18 forecasts tabulated last time, 15 revised real growth down, none up; 15 revised price inflation up, none down; 15 revised the unemployment rate up, none down.

Source: Published forecasts and personal communication. RCA Forecast: RCA Economic Forecasting Model.

Mr. STEIN. I do not regard this as an "optimistic" conclusion. It is, of course, most unfortunate that this loss of output and employment should be visited upon us. I would further emphasize that our calculation depends critically on rigorous measures to cut down private use of gasoline and fuel for residential heating. It will also depend upon efficient allocation of fuels among industrial uses. So our findings by no means signify that we can relax. We shall have to devote maximum effort and clear thought to utilizing the most effective processes we have for managing this shortage, including, of course, the most efficient, reliable, and tested process, which is the market.

I have said nothing here about the price-level effects of the oil shortage. The shortage has already contributed significantly to higher prices here, and will contribute substantially further in this direction. How much will be partly a matter of policy. We will face very difficult questions in balancing our interest in containing inflation with our in-

terest in efficient use of our scarce energy supply to keep production and employment going. Probably the most important thing to say on that subject is that policies which interfere with efficiency are not likely to be for long the policies that contribute most to economic stability.

I would like to close by adding a few words about a statement which you made, Mr. Chairman, about the importance of determining the impact of the energy shortage as a guide to our policy. Of course, that is very important, and that is what we are constantly trying to do. And I would like to emphasize that we do not regard the estimates that we present here as being the end of the road. We will be continuously in the process of reevaluating this picture. And we are preparing to adapt our policy if it should appear that either these estimates or some other estimates which we might make subsequently will call for doing something which we are not doing.

So I do want to make clear that we are presenting to you at this moment our tentative and rather early conclusions about this matter.

Thank you very much.

Chairman REUSS. Thank you, Mr. Stein.

Mr. Sawhill, you may proceed.

STATEMENT OF HON. JOHN C. SAWHILL, DEPUTY ADMINISTRATOR, FEDERAL ENERGY ADMINISTRATION

Mr. SAWHILL. Thank you very much, Mr. Chairman. I appreciate this opportunity to appear before the subcommittee.

I would like to begin by discussing the energy situation in general, and then by going into the impact of the petroleum curtailments that have taken place during the last several weeks.

As late as 1967 this country could produce all of the oil and gas required by the domestic market. There was a substantial excess of production capability and refinery capacity. In half a decade the combination of constant or declining production and stagnation in refinery growth, combined with rapidly escalating demands for gas and oil, have completely reversed this picture. The oil companies and numbers of other experts saw this coming, but their warnings generally went unheeded or were dismissed as merely self-serving.

At the same time, and contributing heavily to our present situation, our use of coal has been declining. The decline goes back to the 1940's, but it has been accelerated in the last several years by our increasing national awareness of environmental problems and concerns. Clean air legislation has forced a major shift from coal and high sulfur oils to the so-called clean fuels, to natural gas, as long as new supplies could be obtained, and to low sulfur oils. In particular, in the Eastern United States, where coal is typically high in sulfur, there has been a significant shift from coal on the part of most electric utilities; and the electric utilities are the largest single market for the primary fuels, accounting for almost a quarter of total fuel consumption.

Now, only a few years after experts began to warn us, we are allocating natural gas—the FPC does that through its curtailment policies. We began 2 months ago to allocate propane, and last month, the middle distillates, such as diesel fuel and home heating oil. Tomor-

row we will publish for comment a considerably broader petroleum allocation program, in accordance with the provisions of the allocation bill the President signed into law less than 2 weeks ago. We began to allocate, obviously, because supply was inadequate to meet demands.

Further, we found ourselves in the position of not being able to increase our domestic supplies very quickly—it takes about 3 years for almost any of the major actions that we could take to increase supply.

This year our dependence on imports was such that one of every three barrels of oil we used came to us from foreign sources, and the outlook for the next several years is that the figure might reach one of two.

In June 1971, the President forwarded to Congress his energy message which defined the problem and gave the outlines of policies necessary to provide solutions. In 1972 the administration sent four major energy legislative proposals to Congress. They included proposals to remove legal impediments to the construction of the Alaska pipeline. The Alaska pipeline bill has been signed into law. In addition, in 1972, the President ordered the Secretary of Interior to increase the leasing rate on the Outer Continental Shelf to increase our supplies of oil and gas.

During this year the President has submitted more legisaltive proposals; on deepwater port facilities, natural gas supplies, and reorganization of energy activities in the executive branch. In addition, the oil import policy has been drastically revised, a $10 billion energy research and development program initiated, allocation programs implemented for scarce fuels, and conservation goals and programs initiated for the Federal Government and the Nation as a whole. A progress report on the Federal program will be distributed on Thursday.

All of these pieces fit together in a comprehensive program to increase supplies of our domestic fuels and reduce demand, while continuing to work toward national environmental, economic, and domestic security goals.

You have probably heard it said that there is no general shortage of fuel in this country, but only shortages of clean fuel. This is true in a sense, because this country has vast reserves of coal, including coals with low sulfur content as well as somewhat larger reserves of higher sulfur coal. However, for the next few years there are likely to be severe shortages of available fuels of all types, high sulfur as well as low sulfur. As a matter of fact, we are working with the coal industry now trying to determine the serious incapacity and the short-range of the coal industry so that we can implement our policy of shifting utilities from oil to coal.

In the longer range coal shortages can be remedied by opening new mines, but it takes 3 to 5 years and a large investment to open up an underground coal mine, and to make sure that there are adequate transportation facilities to move the coal once we have mined it. The oil and gas situation is tougher. It will take an aggressive drilling program merely to maintain present levels of oil and gas production.

That was the situation prior to the Mideast war and the resultant petroleum curtailments.

Now, things are considerably more serious. Of the roughly 17.5 million barrels of oil we consume each day, about 3 million will be lost as a result of the recent cutoffs. One immediate result of the cutoffs has been that, within the past two or three weeks, Wall Street has experienced two of the largest daily losses in history. Oils, chemicals, leisure industries and other stocks dependent on oil and petroleum products were especially hard hit. Analysts agree that the basic cause of these drops, and of other recent fluctuations, has been the current energy crisis and crisis-associated uncertainty.

Obviously, the stock market and the entire economy is sensitive to uncertainties. Uncertainty over worldwide energy developments has created considerably greater uncertainty. It is clearly incumbent upon all of us here to do all we can to reduce the widespread uncertainty that relates to the Nation's energy outlook.

To begin with, we should all bear in mind that the United States was expecting a tight distillate or heating oil situation for this winter, even before the embargo. The situation would have been more difficult if we had a cold winter. We had encountered some very slight gasoline shortages over the past summer, and stocks of refined products were somewhat low going into the autumn. In light of these facts, we had originally forecast that demand for the total range of middle distillates, which includes No. 2 heating oil, diesel, jet fuel and kerosene, would be in excess of 15 percent above available domestic supplies this winter.

We expected that we would have to import over 600,000 barrels a day of these products from the excess refinery capacity of the Caribbean, Canada and Europe. This would have been 50 percent more than we had ever imported before in a 6-month period, and about 10 percent higher than our previous 1-month record level for distillate imports. We thought at that time we could be looking at something in the neighborhood of a 5, maybe even as much as 10 percent shortage of heating oil, in some areas of the country, and possibly about 3 percent nationwide.

On October 16, 1973, OAPEC members announced a cutback in oil production by 5 percent, to be followed by monthly 5 percent cutbacks. Saudi Arabia curtailed production by 25 percent and embargoed all oil to the U.S. Others have followed suit in aiming particularly at the United States. The total reduction of international supplies of petroleum available to meet United States requirements could average about 2½ million barrels per day over the winter if the boycott continues. During this last quarter of 1973, the shortages will average under 2 million barrels a day. Peak annual demand occurs in the early months of each year, and our best estimates show that the shortage will peak at about 3.5 million barrels per day during the first quarter of 1974, before it drops back in the second quarter of 1974. These estimates, of course, provide for weather, and they make assumptions such as the continuation of a leak-free embargo. Incidentally, we are continually updating these estimates as weather conditions change and conservation actions begin to take hold. Because these forecasts are subject to much uncertainty, the projections must not be considered as precise down to the barrel.

As far as the weather is concerned, for example, we have been very lucky so far—in fact, projections are that 1973 will go down as one of the warmest years on record. That is all to the good, but we must also

remember that the weather can change at any time, so we must not count on perpetual good fortune. We must make our plans and prepare to implement actions that will suffice under less-than-ideal conditions. That is the approach we are taking.

The other day we had a report from the New England Fuel Dealers Association, which indicated that in the month of November fuel usage was down by some 10 percent. About half of that was due to weather and about half due to a number of other factors, primarily, I think, our conservation programs. And, as I say, as we continue to go through the winter we will update our forecast on a weekly basis to try to take into account the changing weather conditions and the impact of our conservation measures on demand.

At its peak the shortage could be about 17 percent of projected petroleum demand. In the context of total U.S. energy use, liquid petroleum constitutes 46 percent; thus the reduction in total U.S. energy supplies could be about 8 percent during the worst quarter, January through March of next year. That does not mean that the curtailments would result in an 8 percent impact on each energy consuming sector of the Nation. For some particular fuels—residual oil, for example—the percentage shortfall will be much higher—about 25 percent. But most of our electricity is generated using coal.

Conversely for some fuels, like gasoline, the impact will be about 10 percent—and we probably waste nearly that much.

In other words, there is much scare-talk when there should be more accurate information and greater understanding.

A second point about those statistics is that some of the very high numbers you hear are based on projections of what would happen if we did nothing. In other words, they are the possible shortages that could result for some fuels if we did nothing. They are based on the unrealistic hypothesis that the United States will ignore the coming shortages, and then suddenly run out of some fuels in future months.

Let me assure you that we will not do that. It is true that the United States is already starting to feel the effects of the reduced oil supply from the Middle East. It is also true, however, that we Americans have taken our energy resources too much for granted, and have not considered the full costs of our energy consumption. This shortage is going to require sacrifices from all Americans. The estimates I have given are the calculated difference between demand for fuel as it would have occurred had there been no boycott, and the supply of fuel we can expect if the boycott continues. In other words, these are the expected shortages before account is taken of U.S. government action. They are the target against which our actions are aimed. They are not the shortages we expect after we take account of our actions. We are acting to squeeze down demand, to shift some petroleum demand to coal, and to maximize U.S. oil production within reasonable long-range economic considerations.

That is the situation in general and the situation as it now stands in light of the Arab boycott. Now let me discuss principles we are applying in designing the set of actions to counteract the shortage and some of the actions we are taking.

One important consideration as we set about to act against the shortages is the fact that they would not be felt evenly without Government action. I have already mentioned that various petroleum products will be short in varying degrees. In addition, the geographic

distribution of the shortages is not uniform. Certain areas of the Nation are more dependent than others on imported oil. Some economic sectors, such as transportation, are more dependent on liquid petroleum than others, such as electric generation, which is still heavily fueled by coal in the United States. A greater proportion of some petroleum products, particularly residual fuel oil, and to a lesser extent the middle distillates, are imported into the United States. And finally, one man's leisure activity is the source of another man's livelihood. We are trying to take account of all of these complex factors as we work to counter the energy shortages.

Thus, as a first step we have the problem which we are facing up to, of redirecting flows of petroleum and making a number of adjustments. Transportation patterns and refinery output mix will be changed. There will be fuel substitutions. And other steps will also be taken to redirect the shortage so that it does not hit our economy in a destructive way.

We intend to do all we can to keep fuels flowing to those sectors of the economy where fuel use is directly related to industrial and economic output in order to preserve jobs. At the same time, we intend to insure the maintenance of our public health and safety. We will have to cut back our personal consumption of fuel for home heating, lighting, private automobile travel, and other uses. We recognize that, and we will do it—in fact we are doing it.

This does not mean that commercial and industrial users will not have fuel cutbacks. A priority allocation is not a license to waste energy. It is a certificate of responsibility. Businesses can and must cut back on fuel use of space heating in shopping centers, offices, and places of business. They can recover lost process heat and make use of it. Hours of operation can be shifted, and other devices can be used to cut fuel use. As a matter of fact, we met the other day with an energy conservation group in the Department of Commerce, and several of the major American businesses were represented, and they committed themselves to establishing energy audit committees in each business to cut down on the consumption of energy. A senior official from General Electric told me that they had already cut back 10 percent.

There are other conservation devices which we must apply. Jet flights can be cut back with little effect on total passenger miles carried by judicious rescheduling to raise the present average 50 percent load factors to something like 65 percent. Industry can cut back in fuel use by simple improvements in efficiency of operation, better maintenance, and the installation of very simple devices to save fuel. And industry must do all of those things and more. But we will also do all we can to protect our economy because by doing so we will be acting in the interest of every one of our citizens.

I should make an additional point here, and it is one that I think is often overlooked—at least by the general public. The United States today has a unique opportunity to cut energy demand without major adverse impact on the economy. We are a country with 6 percent of the world's population, and we are using one-third of its energy. We depend upon imports for only one-third of our petroleum, compared with roughly over 90 percent for Japan.

In addition, and in contrast with other nations, we pay little heed to our use of energy, because we have never considered it to be a scarce

resource. Relative to Western Europe and Japan, we are a nation of big cars, undeveloped mass transit systems, and overheated and overcooled buildings. We use more marginally useful gadgets than the rest of the world combined. We probably also use fewer devices that are demonstrably useful for increasing energy efficiency.

There are systems, devices, and technologies available now that can be used by homeowners, by businesses, and by industry to get more output per unit of energy. Yet, America uses relatively few of them. That has been the case because we have long been accustomed to thinking that energy was free—or nearly free. That sort of thinking has led us to profligacy. It has encouraged energy consumption without thought for efficiency.

That situation is changing rapidly. It is fortunate for us that this change began to take place now, rather than in 10 years. By then, the cutoffs really could have hurt. Now, however, they can be viewed as the catalyst for change. And the effects on energy consumption, as well as on energy production, will be long lasting.

The U.S. economy faces a test right now, but it is diverse and resilient. We will feel the pinch, but we will overcome the initial setbacks of the oil embargo. We will do so by taking emergency measures, such as those I mentioned, and, as they are necessary, others. We will meet this situation head on, and we will do so through voluntary measures, resource reallocations, use of price mechanisms, possibly taxes, and other regulations. The actions we are already taking include:

Reorganization of Federal energy-related activities to combine policymaking and implementation authority within the proposed Federal Energy Administration.

A 15-percent reduction in the allocation of home heating fuel, and a 25-percent reduction in distribution for commercial use.

Closing all retail gasoline stations on Sunday throughout the United States.

Directing all U.S. refineries to reduce their allocation of gasoline to retail sellers so that they can concentrate on producing more heating oil and other essential fuels. And the Cost of Living Council recently permitted price changes which will provide the necessary economic incentives to assure that this happens.

Setting the maximum speed limit for automobiles, commercial trucks, and buses in the United States.

Cutting the allocation of jet fuel to civil aviation by 15-percent.

Authorization for the Atomic Energy Commission to divert, on a shortage case-by-case basis, electricity from its uranium enrichment processing. That authorization means that when utilities are shut down to convert from oil to coal, end-use customers will not be deprived of service.

Publication of an allocation program for a wider range of petroleum products, including residual fuel, gasoline, and others not previously covered.

And finally, the shift from oil to coal in utilities that Mr. Stein mentioned.

The administration has drawn up contingency rationing plans. No final decision has been made on whether or not to implement an end-user rationing program, but I can assure you that the program will be implemented if necessary, and further, that its thrust will be

to make the most efficient use of our energy supplies. We will make a decision on rationing by the end of December.

We will not create a recession either by ignoring this crisis or by panicking in the face of it. Recessions are a result of a decline in output. Inaction or rashness might contribute to such a decline. We intend, however, to enhance America's productive potential by insuring adequate fuel supplies for industry. As I have said, that will mean that every citizen, as well as every business, will have to work to conserve energy and to use less of it more wisely. We believe that by providing for as much of our real need as we can, and by cutting our energy waste, we will be acting in our own best interest, and in the best interest of other nations.

We have established a special economic impact office in the new Federal Energy Administration, or what is now the Federal Impact Office. The economists we have in this office will work closely with the Council of Economic Advisers and with other Government departments to minimize the impact of the fuel shortages on industrial output. We are also letting a series of contracts to study detailed energy usage by industry. The information gained from these studies, and from the work that the Economic Impact Office will do in conjunction with other Federal agencies, will provide a firm basis measuring the economic and industrial impact of any energy policy option.

Nevertheless, the economic impact of the energy crisis depends most of all on the willingness of Americans to respond to the challenge of reduced energy supplies. As Mr. Stein, chairman of the Council of Economic Advisers has stated: "The energy shortage may reduce the growth rate somewhat below that otherwise expected, and there may be some increases in unemployment." But these potentially minor shortfalls are from the healthy growth previously forecast, and are predicated on the ability of all Americans to make those adjustments necessary to reduce the potential impacts to minimum.

Mr. Chairman, this concludes my statement.

Chairman REUSS. Thank you, Mr. Sawhill.

You heard Mr. Stein testify that the unemployment in 1974 may be as high as 6 percent?

Mr. SAWHILL. Yes, sir.

Chairman REUSS. That would be an increase of 33⅓ percent over the rate last month, would it not?

Mr. STEIN. It is an increase from 4.7 percent.

Chairman REUSS. Last month it was 4.5 percent.

Mr. STEIN. I should remind you that I said that the unemployment rate would not exceed 6 percent.

Chairman REUSS. That is what I said. But it could be 6 percent?

Mr. STEIN. We think it would not be 6 percent, it would not be as high as 6 percent. Our estimate—and I indicated that we have a range of estimates—is that this number is likely to lie in the range between 5½ and 6 percent.

Chairman REUSS. An increase to the top range you give of 6 percent would mean that 1.3 million Americans who now are not unemployed would be, is that not so?

Mr. STEIN. That is about right, if we go to the top of the range.

Of course, as you know, these figures aren't readily translated into numbers of people who are unemployed, because in the course of a

year, in a year in which the average unemployment is, say, 4 million, there are likely to be 8 or 9 percent, or perhaps 10 million people experiencing some unemployment, but for relatively short periods.

Also, as I have tried to indicate in my statement, the addition to the otherwise expected unemployment that results from the energy crisis itself we have thought would be in the neighborhood of 0.3 to 0.6 percent. We have expected, as most other people have, that there would be some increase in unemployment in 1974 in any case.

Chairman REUSS. To those who are unemployed it does not make much difference whether they are unemployed due to the energy crisis, or due to the fiscal and monetary mistakes which the Government makes, or due to acts of God, or anything else; they are unemployed, is that not so?

Mr. STEIN. That is so.

It may make some difference as to the policy adopted to deal with it.

Chairman REUSS. Would you share the view of Mr. Sawhill that this potential vast number, hundreds of thousands of unemployed, is a minor shortfall? I am using his words.

Mr. STEIN. I think these words, like "minor," "disastrous," and so on, are really not helpful. We are very concerned about it. It is a lot of people, and let us not say anything more than that. We will do what we can to make it less. I think what Mr. Sawhill is involved in is trying to allocate this shortage in a way which minimizes its effect upon unemployment; that is, contributes to making it less. So we do not welcome this by any means. We are trying to hold it down. One has to recognize that everything has its cost, including the reduction of unemployment.

Chairman REUSS. Another statement made by Mr. Sawhill is: "These increases in unemployment are predicated on the ability of all Americans to make those adjustments necessary to reduce the potential impact to a minimum."

An American who finds himself numbered among these hundreds of thousands of new unemployed—what is his ability to make the adjustments until somebody gives him a job?

Mr. STEIN. I don't think that is the point. I think the point is that these other hundreds of millions of Americans who are not unemployed can reduce the danger of somebody being unemployed by conserving fuel. The more natural gas they burn up in heating their houses, the more people are going to be unemployed in the petrochemical industry, and other industries. The more they can save on the use of gas or oil for heating their houses, the less unemployment there will be as a result of energy conservation in the economy.

Mr. SAWHILL. And that was the intent of that action, Mr. Chairman.

Chairman REUSS. Whatever the number of new unemployed there will be in 1974, whether it is a million or somewhat less than that, what measures does the administration propose to deal with those who have become unemployed due to the energy shortage and to any other causes; what are you going to do about cutting down their number and seeing that they get a job?

Mr. STEIN. In the first place, as we have tried to indicate, we will try to manage the shortage in a way which will minimize the unemployment. As I have already indicated, we do face in 1974 a very difficult situation, because on the one hand, prices will be high, we will still

have a high rate of inflation, and we will have shortages in many parts of the economy. The usual means of stimulating the economy in order to increase employment will run into the danger of accelerating inflation and tightening up shortages. So that is a question—I don't mean by saying that to say that we disregard the unemployment problem, but only to indicate the nature of the consideration that must be balanced. We are in the process now of developing plans for actions that could be taken to support employment, to increase employment in the country, if it should appear that the outcome was going to be toward the upper end of the range of possibilities that we foresee. We are thinking of a number of things, mainly through the budget, although not entirely through the budget that—I could list, if you would understand that those are things that could be considered.

Chairman REUSS. Let's hear them.

Mr. STEIN. As possibilities—and without the thought that any of them have now been determined upon.

We do have a number of areas of the budget where expenditures need to be pushed forward on their own account, and where there would be a particularly timely occasion to do it if we were to be faced with a fairly significant unemployment problem. One of these is defense. A second is the energy program itself which we will be pushing ahead in any case.

Chairman REUSS. Then you can't really count that, then? You are giving me a list of the things that you are going to do if your predictions materialize at the upper range of unemployment. So I don't think you can properly say, we are going to do something about the long-term energy situation since you are going to do that anyway—I hope you are going to do it anyway——

Mr. STEIN. We have a problem about how those things are going to be financed. We hope we will do it. I would not include this in the list, but I want to remind you that we have before the Congress a proposal for improving the unemployment compensation. We are looking once more at the possibilities of a public service employment program which might have certain advantages in this situation that it might not have in some others because of the particular spottiness of the unemployment that might arise in the shortage situation. We also considered the possibility of providing some stimulus to housing, although it is my own belief that there will be a favorable response in the housing situation to the energy shortage in any case, because our whole estimate of the slowdown in the economy depends very heavily on the proposition that consumers increase their savings rate, which will mean more funds in the thrift institutions, and more funds available for mortgages, and probably a better condition for housing to go forword.

But, anyway, those are some of the measures that we now are considering. Of course, there would also be the general matter of monetary policy. But I want to reemphasize that we will face, assuming the energy crisis continues, a particularly acute choice here between stimulating the economy to support employment and reduce unemployment in conditions where the unemployment is likely to be particularly spotty, and where the inflation rate is high. But I caution you about that. I want to say that we are directed to explore vigorously and affirmatively what means can be used to prevent this from getting too serious.

Chairman REUSS. I am glad to hear you say that you are considering public service employment, because to my mind that is just what the

doctor ordered for the situation which confronts us. It isn't a violent turning on of the fiscal and monetary machinery, just resulting in more inflation. Public service jobs are probably the least users of energy and the least chewer-uppers of raw materials that there are. Our backlog of necessary public service tasks that need to be done is greater than ever before. But just a week ago before the House when I tried to put in a public service employment provision I was met by the rebuttal that Mr. Nixon would veto any such thing. It was recalled that he regards this as WPA leaf-raking, as dead-end jobs. What makes you think that he has changed his mind?

Mr. STEIN. I don't know who told you that he would veto it. I am not saying to you now that we are proposing or supporting this. We are considering it with no initial hostility to the idea. And we are considering it on his instructions.

Chairman REUSS. Senator Proxmire.

Senator PROXMIRE. Gentlemen, I think that you would agree that the first thing you have to have in order to have economic policy that works is accurate facts and accurate data, accurate information. I think all of us are pretty disturbed by the revelation yesterday that the shortage was not estimated properly. The President's speech of only 2 weeks ago appears to have been based on inaccurate information. At that time he estimated the shortages, as I understand it, as something like 3.4 million barrels a day. Now we are told that the shortage might be less than that. I understand Mr. Sawhill's estimate this morning is about 700,000 barrels a day less. The information that we get in this area all seems to come from petroleum industry sources that seem to be very, very unreliable. It seems to me it is just unconscionable that we have to make our decisions and base our policy on information that we simply can't count on. We have the appalling situation that was disclosed by the Antitrust and Monopoly Subcommittee in the Senate, the Hart subcommittee, that had subpenaed records that showed reserves of gas up to a thousand percent greater than the firms consistently reported to the American Gas Association.

Now, how reliable is this later estimate that we have that the shortage will not be 3.4 million barrels a day, but some 700,000 barrels less than that? Can we count on that? Is this still some kind of a rough estiate, or is it something that is reliable?

Mr. SAWHILL. Maybe I could address myself to that, Senator Proxmire.

The President's estimate of 3.4 million barrels included an increase for the Defense Department of about 300,000 barrels. So adjusted for that increase, we come to a figure of 3.1 million barrels. The figure that was published——

Senator PROXMIRE. That 300,000 barrels required by the Department of Defense should be included, should it not?

Mr. SAWHILL. Yes, sir.

I am trying to make a comparison with the estimate published in the New York Times yesterday by the Foreign Petroleum Supply Committee.

Senator PROXMIRE. They did not take into account the 300,000 barrels?

Mr. SAWHILL. Yes, sir.

The difference, then, is about 700,000 barrels. I think we are going to find some changes in these estimates as we go through the winter. We

have tried to estimate very conservatively at the upper end of the range; in other words, we have taken into account a normal winter, and then we have increased our estimates of shortage to account for the fact that we might have a somewhat colder than normal winter, and we have planned our policy on that basis. So far this year we had a warmer than normal winter.

Senator PROXMIRE. Let me interrupt at that point to say that I am told that if this winter is milder than 9 out of 10 of the average winters we have had in the last 100 years, the savings overall would only be about 1 percent, about 5 percent in the heating oil shortage area, and overall about 1 percent in our total shortage.

Now, are those figures not correct? It would be a much greater saving if it is milder than 9 out of 10 of the last 100 winters——

Mr. SAWHILL. Clearly.

Senator PROXMIRE. But if it were 1 out of 10, which is pretty optimistic estimate, we would still be saving only about 1 percent overall, is that right?

Mr. SAWHILL. Roughly that is correct, yes. But that still is a couple of hundred thousand barrels a day. So one reason that your estimates have changed is the fact that we have had some warmer weather. I think another reason is that we have seen less drawdown in stocks than we might have expected. I think this has been a combination of the weather factors, and also some of the conservation measures that we have already put into place. In other words, I think people are driving at 50 miles an hour and turning down the thermostats, and this is having an effect.

As I mentioned in my testimony, we have talked to the New England fuel dealers recently, and they estimate that demand has been 10 percent——

Senator PROXMIRE. You made it very clear in your statement, Mr. Sawhill, when you were talking about the shortage without any of the measures the Government has put into effect——

Mr. SAWHILL. Yes.

Senator PROXMIRE. And now you are talking about the savings that have resulted in this area. I would agree that those are constructive proposals. They are saving something like the President estimated. But this doesn't change the basic 700,000 figure.

Mr. SAWHILL. No.

Mr. STEIN. The forecast of the first quarter depends on the inventories when you enter the quarter, and if you have achieved certain savings before you enter the first quarter, the requirement for cutting back in the first quarter will be——

Senator PROXMIRE. Were the original inventory estimates accurate?

Mr. SAWHILL. No; they weren't inaccurate, it is just that because of the conservation measures and because of the milder weather, the inventory pattern has behaved differently than what we expected.

Senator PROXMIRE. You say that you expect those estimates to be changing as the winter goes on?

Mr. SAWHILL. Yes, I think so.

Senator PROXMIRE. Within what range?

Mr. SAWHILL. Well, the estimate of the Foreign Petroleum Supply Committee, I understand, is plus or minus 500,000 barrels a day. That is a very large range.

Senator PROXMIRE. Would this be a principal factor in determining whether we go to rationing or not at the end of the month; is that what the administration is waiting for—to see how this develops in the next 3 or 4 weeks?

I understand the decision will be made on rationing by the first of January.

Mr. SAWHILL. I think that is one factor, yes.

Senator PROXMIRE. What other factors are there?

Mr. SAWHILL. I think we want to get a better understanding of how the American people feel about rationing. I think we want to do more work on different kinds of rationing proposals and get a better understanding of the nature of the bureaucracy we would have to set up to administer rationing to see if there is a way to simplify it.

Senator PROXMIRE. Let me ask you about the impact of rationing. I think nobody wants it if there is any better alternative. Just today it was indicated, I got this on the radio this morning, that the oil companies are asking the Cost of Living Council for a 1- to 3-cent-a-gallon price increase at the pump—they may or may not get it.

One option, I take it, the major option, certainly, is a price increase?

Mr. SAWHILL. Yes.

Senator PROXMIRE. There are many people, in the administration and outside, the economists, who say that, "This is the way to go." Can you give us any idea based on present estimates of how large a gasoline price increase we would have to have in order to bring supply and demand into balance?

Mr. SAWHILL. We don't have very good figures on demand elasticity, frankly. But I think the best estimates we do have indicate that we would have an increase, either a price increase or a tax in the range of 30 cents.

Senator PROXMIRE. 30 cents?

Mr. SAWHILL. Yes—in order to reduce demand by the amount of the estimated shortage. This includes not only the fuel shortage of gasoline, but the additional shortage that we will get as we encourage refineries to shift from the production of middle distillates to gasoline.

Senator PROXMIRE. If you had the 30-cent-a-gallon increase, not by a tax, but by a price increase, wouldn't you have enormous windfall profits for the oil companies, oil industry?

Mr. SAWHILL. There is no question about it.

Senator PROXMIRE. What can we do about that without a tax increase of some kind?

Mr. SAWHILL. I think that you can either have a tax rather than a price increase, or you can have some kind of an excessive profit tax to eliminate those windfall profits; or a third alternative would be to direct those profits back into production and refining sectors of the business.

Senator PROXMIRE. I was going to say that one of the purposes in the price increase is to increase production. One purpose, of course, is to reduce consumption.

Mr. SAWHILL. Yes, sir.

Senator PROXMIRE. But the increase in production, it would be so long range that it wouldn't help much in the next 6 to 8 months.

Mr. SAWHILL. That is correct.

Mr. STEIN. Can I say something about that?

Senator PROXMIRE. Yes, Mr. Stein.

Mr. STEIN. I think it is a mistake to put those questions in an all or nothing perspective even thinking about the price increase. One can consider that there would be some magnitude of a price increase which would be important for the supply problems, both in the short run and in the long run. There is no point to saying that the price increase will only have its effect on supply in 2 or 3 or 4 years.

Senator PROXMIRE. I am certainly not trying to make any assumption of that kind—I will agree that it might be a combination of things, some price increase, some tax increase, and some rationing.

Mr. STEIN. So it seems to me that the way to look at this is to say, well, we want to get all the voluntary conservation that we can. We should permit such net price increase to the companies, to the producers, as will be useful from the standpoint of our longrun problem of adapting to a condition of self-sufficiency. That will be a fairly significant price increase. We should then consider whether——

Senator PROXMIRE. Let me stop right there.

You said that it would have to be a very substantial price increase in order to get longrange—what, increased investment in the oil industry to get more production?

Mr. STEIN. Increased production in the oil industry?

Senator PROXMIRE. Haven't we had an enormous increase in profits in the oil companies in the last years, averaging 60, 70, 80 percent?

Mr. STEIN. We have had increases in prices and profits. But the price of crude oil in the United States is still below the levels at which it will be profitable to exploit the sources of energy that we are going to have to exploit in the United States in order to achieve the goal of self-sufficiency which, I think, is very important for us to achieve. If we are going to get another x million barrels of oil out of shale, out of deep offshore drilling operations and other sources, the price of oil is obviously going to have to be higher than the present price of crude oil in the United States.

Senator PROXMIRE. How do you know—the fact is that the industry itself is sitting on all the figures. I have heard repeatedly that if you have a situation that we have great reserves that they know about, but haven't actually proven, but they are waiting until the supply-demand situation in this country will be so serious that the Government and the public will surrender to a substantially higher price, only then will they move. It is not a matter of simple economic arithmetic, it is a matter of oil companies looking out for their interests in terms of a much higher price.

Mr. SAWHILL. If you are suggesting, Senator Proxmire, that your information is not as good as it should be, I think you are correct. And, as a matter of fact, we intend to come back to the Congress within the next 60 days or so and in a separate bill ask for some mandatory reporting requirements, because we think that we need to improve our information base as well as you do.

Senator PROXMIRE. It is so appalling—last month we had one of the biggest increases we have had in a long time in the wholesale price of gas. It was very largely due to the increase in petroleum prices. I tried to find out from the Bureau of Labor Statistics how accurate those estimates we had were. They said, "They had to rely on Platt's Oilgram, they had to rely on the industry itself for their estimates."

Just last month the increase on an annual basis, as I understood it, was 35 percent for petroleum production—not annual——

Mr. STEIN. No, that was just a 1-month increase.

Senator PROXMIRE. On an annual basis, then, it was 400 percent. The domestic price is now over $5 per barrel.

Mr. STEIN. Not on the controlled crude; no.

Senator PROXMIRE. How high does it have to get?

Mr. SAWHILL. I think, as Mr. Stein was saying, if you look at where alternative sources could be produced profitably, that is in the range of $7 a barrel. I am talking about oil shale and coal gasification and liquefication.

Senator PROXMIRE. $7 a barrel? I want to come back to that shortly.

Mr. STEIN. I would suggest a way of looking at that. We may have a disagreement about the quantities involved, but we should determine what price increase—and I am sure it is some—is required in order to bring about the investment in exploration in new sources of fuel that will generate self-sufficiency. We have to think beyond that whether we should allow some further price increase for the purpose of achieving a more efficient allocation of the supply of oil. When we think of that, we don't think just of private passenger use of automobiles. We have a problem of allocating the supply of fuel among all industrial users, among business uses, automobiles, and so on. If you think that it can be done by an administrative process and done efficiently, you have a lot more confidence in the Government administrative processes than I do. When we think of that and say that this would yield revenues beyond what can be reasonably justified as an incentive for production by the energy industry, then we do have to think of some way to sop this up by some form of taxes.

Having done that, we should then consider, are we left with a serious disorderly situation at the gas stations—and if we are, then I think that rationing becomes a reasonable alternative. But, as I said, I think we have to see what is the most efficient combination of those measures. Rationing has become a kind of symbol for efficiency and fairness, whereas those of us who are old enough to have lived through World War II realize that that is something as to which people will be disillusioned about within 3 months.

Chairman REUSS. Mr. Sawhill, you mentioned the President's effort to secure gasoline conservation by closing the gasoline stations on Sundays so that persons will only be able to drive a very small number of miles on Sunday, by reason of the fact that the gasoline stations close at 9 o'clock Saturday night. Are you aware of the fact that General Motors is responding to the energy crisis by now offering on its 1974 super station wagon an optional 40-gallon gasoline tank? That is the largest gasoline tank in the history of automobiles.

Mr. SAWHILL. No, I am not aware of that fact. That certainly makes ineffective the Sunday gasoline closing, I would think.

Chairman REUSS. And it would lead, would it not, to justifiable anger on the part of the millions of good citizens in this country who are trying to conserve gasoline by obeying the spirit of the Sunday closing rule? It would make them pretty mad, wouldn't it?

Mr. SAWHILL. Yes.

I just think it is terribly important that we get on with this job of energy conservation. And, obviously, one of the most important areas that we have to work on is our transportation system.

Chairman REUSS. Would you ask General Motors to forthwith withdraw that 40-gallon option, and then report back the results of your request?

Mr. SAWHILL. I certainly will discuss it with them. I will be glad to report back the results of that.

Chairman REUSS. Thank you.

Mr. SAWHILL. But I think this whole question of the automobile has to be looked at very carefully. I think we have to look at ways of requiring, through economic incentives or some other way, automobiles in this country to be a lot more fuel-efficient than they are today. That has got to be one of the answers to this problem that we face.

Chairman REUSS. On the subject of the immediate situation, the Department of Interior, as you know, has their category or checklist which they call "Minimum operable inventory levels" of residual oil and heating oil and gasoline. What that category means, according to the Department of Interior, is the amounts required to maintain an orderly flow of oil through the pipelines and to provide cars and trucks and tankers.

How close are we to getting into the danger area on these inventory levels on the three properties mentioned, residual, heating oil, and gasoline? My information is that we are almost there now; in fact, we will be there in residual oils, and that before March 1, the date that Mr. Simon indicated is the date on which a decision whether or not to ration will be made, we will be below the danger line.

Is that true?

Mr. SAWHILL. Clearly, our first estimate on residual oil particularly was that we are almost there now. I believe in the case of the other products we were—that minimum operable level, or whatever the terminology was off into the end of January or early February——

Chairman REUSS. That is the information that came to me, too. That is not good, is it?

Mr. SAWHILL. No, it is not good.

If I could comment on the residual situation—because that was the one that was really most critical to us—as a matter of fact, we already passed our earliest estimate on the minimum operable level. What we did was to investigate and send teams out to utilities to determine the secondary stocks of residual oil at those utilities—and we found that they were much larger than we had originally anticipated. So I think the problem with the residual minimum operable level is now in the same range, late January or early February, as the other two products. The situation still isn't good. I don't want to pretend that it is. But it isn't as serious as we previously assumed.

Mr. STEIN. Isn't it correct that the estimates which have been made of the date on which the minimum operable level would be reached were based on the assumption that the entire shortage was met out of inventories. That is, it assumed that no measures were taken to reduce the rate of use?

Mr. SAWHILL. Yes, that gets back to the question Senator Proxmire raised about why are those estimates always changing. I think they are changing because the inventories are constantly changing, and

they are responding to the actions that we take and to the weather conditions, and frankly, because we are getting better information on inventories.

We recognize that we have just got to have accurate information in order to make policy decisions. While we have had good information on primary inventories, we haven't had on secondary inventories, and we are in the process of getting that now.

Chairman REUSS. Inventories on all three of the petroleum products we are discussing have recently gone down and that is the reason we are concerned.

Have you perceived any check in the process? Have you perceived them going up again to less dangerous levels? I have not.

Mr. SAWHILL. No. But I think the declines have been less than our previous forecast. And so, to that extent we have been encouraged by what has been happening.

Mr. STEIN. There is a normal seasonal reduction this time of year to the inventories on those things.

Chairman REUSS. Mr. Stein, in your estimates in your statement about the impact of energy cutbacks you mention that on the demand side you include about 300,000 barrels a day of military requirements, previously met from foreign sources, but now expected to be met from domestic supplies.

Does that 300,000 barrels a day include oil for re-export to the South Vietnamese military to supply their needs?

Mr. STEIN. I don't know the answer to that question.

Mr. SAWHILL. It does.

Chairman REUSS. You think it does?

Mr. SAWHILL. Yes. The way I should tell you is, we have been given these requirements by the Defense Department, and we are carefully checking them, because obviously it makes our job a lot harder if, in fact, we have to supply those additional 300,000 barrels a day.

Chairman REUSS. Mr. Stein, have you considered what can be the effect on the U.S. economy of an economic slowdown in Western Europe and Japan as a result of curtailed Middle Eastern oil shipments, and particularly if such a growth slowdown does occur, how would if affect U.S. exports, and if it is going to affect U.S. exports, how in turn is that going to affect employment and unemployment?

I know there are a lot of assumptions there.

Mr. STEIN. We considered this all right. And that is about all I can say. There are possibilities in either direction which we find quite impossible to quantify under present conditions. Of course, we don't know how much the economies of the other countries will be affected, since we don't know yet the extent of cutbacks in their oil supplies that will occur. Assuming that they do have substantial reductions in their output resulting from oil shortages, we would expect them to be trying to buy from us large quantities of high energy content products as a way of keeping their economies going. We also would expect that they would become much weaker competitors in third markets. And there probably would be some reduction in their sales to us.

On the other hand, they will have all the derived effect of lower income which would make their consumers less good markets for our

products. So we just could not conclude which way the net effect of this would run. We are trying to get a better picture of this through contact with other major countries, and we hope that through the work of the OECD we will be able to get a better picture. But at the moment we have assumed that this is a wash.

Chairman REUSS. So you did not include in your unemployment projections any effect for the possible dimunition of our exports due to less end growth?

Mr. STEIN. We didn't include any possible effects due to expanded growth. We didn't know whether the effect of this would be plus or minus.

Chairman REUSS. The possibility of a negative impact is obvious; namely, lower growth, less purchasing power. The countereffect you say produces a washout—I think it is instinctively a self-wash, because if we are going to produce high energy exports for Europe, that means we are going to have to allocate our scarce resources to energy-intensive industries, and put other people in this country out of jobs. So while I don't want to be a harbinger of gloom, neither do I want to be a Pollyanna about this; and I would recommend to you to take another look at this issue.

Mr. STEIN. I would share your desire not to be a Pollyanna about this.

We have considered both aspects of this thing. I think one would find it difficult to conclude on the basis of anything we now know which way this will go. One, at least, shouldn't extrapolate from the experience in previous foreign slowdowns, because those previous foreign slowdowns originated mainly on the demand side.

Chairman REUSS. Just one more question about the Council of Economic Advisers' assumption.

In making your estimates, what assumption did you make about the continuation of the Arab embargo? Was it to end on April 1, July 1, September 1, or continue throughout the year?

Mr. STEIN. For the purposes of these calculations, we assumed that it would continue throughout the year.

Senator PROXMIRE. Mr. Stein, you don't really argue that if you have a slowdown or even a recession—say, you have a substantial recession in Japan and in Europe, because of the energy shortage—say, that some of the predictions that are coming out of this country are that there is a 5-percent reduction in production in the coming year. If that should eventuate, wouldn't you agree that that would have an adverse effect on our production, substantial adverse effect? Wouldn't that, in effect, be a worldwide recession that is bound to communicate itself in lower exports to such an extent that we would have to reduce our unemployment substantially?

Mr. STEIN. I would like not to use this word "recession" in such a general way.

The conclusion you are drawing is derived from the usual kind of recession that countries have experienced in which they have a reduced demand for output, both their own output and foreign output.

Senator PROXMIRE. I am not talking about reduced demand, what I am talking about is a situation of shortages in economies that are very, very dependent on Arab oil, far more than we are. Japan imports 80 percent of its energy requirements from the Arab countries—the

European countries import far more than we do. If because of that they have to have a drastic economic reduction, isn't that bound to communicate itself adversely to us regardless of any so-called washes?

Mr. STEIN. No. I think there will be two reactions on their part. I think that there will be a ferocious demand on their part to try to keep themselves supplied with raw materials which they otherwise would have produced themselves out of imported oil. After all, they do have a lot of dollars, and they will make an effort, I assume, to keep their economies running, and they will try to import for that purpose. It will not be the usual situation in which they have an excessive supply of practically everything, which is the usual situation in a recession.

On the other hand, they will not buy things that are not vital to their productive processes. So I think there will be effects on both sides. As I said earlier, those estimates are very iffy, they are very speculative. And if you would like to put in another billion or $2 billion to the loss of GNP for that, I couldn't say that is unreasonable.

Senator PROXMIRE. I am very disturbed in view of the clear and emphatic impact that this embargo is going to have—if it continues on Japan and Europe, I am disturbed that that wasn't cranked into your calculations.

Mr. STEIN. I told you how we cranked it in. We cranked it in, and it came out zero.

Senator PROXMIRE. That is what disturbs me.

Let me ask you this. In your statement you refer to the fact that the administration has a call for Congress: "To remove ceilings on prices of additional supplies of natural gas, which will both get more gas produced and get more moved to where it is most needed." This is very, very disturbing for those of us who believe that natural gas represents, to a considerable extent, a monopolistic operation. And, if you remove the ceilings, I understand—perhaps I am unfair—do you mean you would deregulate natural gas?

Mr. STEIN. Deregulate new natural gas; yes.

Senator PROXMIRE. What do you mean by new natural gas? How do you determine what the new is?

Mr. STEIN. It would be in addition to production in some base period.

Senator PROXMIRE. An addition to production? So the information that many of us have, and what many of us expect is the case, is that if for this reason, hoping for deregulation, the companies of course are holding down their production now. And once they get the opportunity to increase the price they will do so.

I have read estimates as high as 75 cents a thousand cubic feet—and the present average is around 25 cents. In other words, a threefold increase.

Mr. STEIN. Well, Senator, we live in the real world. If you know some other way to get it than paying for it, I would like to hear it.

Senator PROXMIRE. There isn't any other way—and I would certainly want to do whatever is necessary in terms of price increases to get increased production. You have the Federal Power Commission that now regulates gas. Two members of that Commission of five want to deregulate it, and two more want to deregulate it as far as new natural gas is concerned. You could hardly have a more unsympathetic agency.

Natural gas had increases in prices over the last years, about 40 percent. How much do they have to have in order to get increased production?

What bothers me, Mr. Stein, is the position that you put consumers in that make commitments to buy their gas, and then they have no choice, they have to throw out—I'm talking about a household—a couple of thousand dollars of equipment in order to move to a new source, so they don't have any option, they have to continue to buy natural gas no matter what it costs.

Mr. STEIN. Yes, Senator, but this is the same problem we had with the chickens, you remember, we had cheap chickens, but then there were no chickens—you can have cheap gas, but the people that want gas to heat their houses will not get it.

Senator PROXMIRE. I am not talking about requiring them to produce below cost. Give them profits, big profits, but not this exorbitant increase, a threefold increase.

Mr. STEIN. I haven't suggested any threefold increase. But the fact is that we know that gas is being used for very much less valuable purposes in the United States that produce it than it is used or would be used for in the Northeast. We are going around the world talking about buying gas from the Algerians or the Russians at very much higher prices than we would pay our own people to supply it.

Senator PROXMIRE. Let's take that into consideration. Let's take the increased cost of gasoline you talked about, 30 percent a gallon, into consideration. What effect do you see this as having overall on inflation in 1974? How big an increase will these particular fuel prices have in your view? If they go into effect, if we deregulate natural gas and we permit the supply-demand situation to be reflected fully in the price of gasoline.

Mr. STEIN. Well, of course, the deregulation that we have suggested on natural gas would not apply to total supplies, but only to some part of this. I would think that we would be adding something like one-half to 1 percent to the U.S. price level.

Senator PROXMIRE. Just from that one source alone?

Mr. STEIN. From all energy, not just from gas.

Senator PROXMIRE. Of course, one-half of 1 percent is a couple of billion dollars, or $3 or $4 billion of increased prices.

Mr. STEIN. It is more than that.

Senator PROXMIRE. How much more? Would it be $10 million more?

Mr. STEIN. No; let's say $6 million.

Senator PROXMIRE. I agree that we have to pay something. Let me ask something about the longer range situation. The President in his speech 2 weeks ago put great emphasis on developing independence for our country for our energy resources. It is nice rhetoric, and we like it. But that has been challenged very strongly by people who are highly competent in the area. You say that that can come at a very high cost, and it may not be worthwhile for us to become that independent. Maybe we should. But have you made any estimate as to the inflationary effect of total independence as compared with some reliance on the foreign sources for our energy?

Mr. STEIN. Well, I don't know whether the people who threw the tea in the Boston Harbor made an estimate of its effect on the price level.

I think if it is 1 or 2 percent or 3 percent on the U.S. price level, our independence is worth it. I guess what is implied in what was said earlier is that—and people have made estimates of this, so this is all secondhand for me—we would achieve independence at a price equivalent of $6 or $7 a barrel of crude.

So this might add one-half to 1 percent to the U.S. price level, or perhaps something more, spread over the course of this period. I think that in any case we are going to face higher prices of energy and higher prices of petroleum products, and we have to decide in part how much of it we are going to pay to the Arabs and how much we are going to pay to ourselves.

Senator PROXMIRE. Let me get back to the colloquy we had just a minute ago. You estimated the increased cost for bringing supplies and demand into balance in those areas with the whole energy situation at one-half of 1 percent.

Now, recent price increases for gasoline and fuel oil, our staff tells us, have added already $200 or $250 to the annual budget of the family which heats with oil and drives. Now, that would mean a 2-percent increase, or 2½-percent increase for a family with an income of $10,000 a year, which is an average family. And the kind of increases that we are suggesting, 50 cents a gallon, and a trebling of natural gas prices, would certainly be far greater than simply a one-half of 1 percent increase, would they not?

Mr. STEIN. Well, let me withdraw that estimate, then, and start over again.

The weight of energy products; that is, gasoline, oil, coal, natural gas, and so on, in the Consumer Price Index, is about 6 percent. And one would have to calculate about what the size of the energy price increase would be. The increase in the prices of the petroleum part of this would be larger than the rest of it. The gasoline and oil themselves account for about 3 percent of the total. I would say at an extreme, assuming that everything went up 50 percent, that we could have a 3-percent increase in price to the U.S. price level.

Senator PROXMIRE. Do you think that is realistic?

Mr. STEIN. I think it is possible.

Senator PROXMIRE. You say you think that is the outside limit?

Mr. STEIN. As we have said, elasticities are very difficult to calculate.

Senator PROXMIRE. This would represent, then, more than a 50-percent increase in the inflation that we would have had, that we were estimating before the crisis developed, isn't that right? Weren't we estimating something like 4½- or 5-percent inflation? Now you say it may be as much as 3 percent more, so that would add up to 8 percent.

Mr. STEIN. That would involve a total decontrol of things. The estimate that we have made ourselves for the addition to the U.S. price level is about 1 percent, and that is very close to the estimates which have been made in the statistics that I have presented here earlier. The percentage change in the GNP deflator for 1974 over 1973, which by this group of forecasters has been previously estimated at 5 percent, is now estimated at 5.9 percent.

Senator PROXMIRE. So they would bring it up almost 1 percent?

Mr. STEIN. Yes.

Senator PROXMIRE. And, depending on the policies we have, of course, those estimates might be based on the assumption that we might

have some kind of rationing which would reduce the increase at least in the short run, but in the long run it may not be wise policy—isn't that right?

Mr. STEIN. That is right.

Senator PROXMIRE. Now, if we have a 30-cent-a-gallon increase—in gasoline prices, and these other enormous increases that we are talking about—one possible option is to greatly reduce or eliminate the present enormous tax advantages the oil companies enjoy. I am talking about the oil depletion allowance, the intangible drilling, and all these other things, so that the average oil companies now pay taxes on their net income of only 8 percent compared to 40 percent of other industries.

Is that, in your judgment, a viable option, or would we be trying to go two ways at the same time?

Mr. STEIN. No, I think that is an option that would have to be considered in those circumstances.

Senator PROXMIRE. Wouldn't it be very logical if this country is going to be independent for us at least to deprive the oil companies of these advantages when they are drilling abroad? Particularly when they are investing out of this hemisphere, why should they have the oil depletion allowance and intangible drilling and that special gimmick of being able to deduct royalties from their taxes as a tax credit, if we are trying to become independent of foreign oil?

Mr. STEIN. I think that is a reasonable statement that you have made. I do not want you to put me in the position of stating what the administration's position is, because there are a lot of people that have to talk about this. But certainly there is logic in what you are saying.

Senator PROXMIRE. I'm sorry, I didn't get the last part.

Mr. STEIN. I say, certainly there is logic in what you are saying. We are in the process of considering the whole bundle of taxation as it affects the energy industry. We have not produced a recommendation. All of these things involve a great many considerations—but certainly the consideration that you have just mentioned is an important one in my mind.

Senator PROXMIRE. That is very encouraging.

It is more helpful—and the only opportunity we have of correcting a serious inequity is to have administration support for it.

Let me get back again to the issue of rationing as compared to a price increase or a tax increase or some combination.

Have you estimated how much revenue a tax rise, a gasoline tax increase, would bring in if it were used to try to bring supply and demand into balance?

Mr. STEIN. If it were used to what?

Senator PROXMIRE. If it were used to try to bring supply and demand into reasonable balance.

Mr. STEIN. If it were used by itself, we are dealing with very large numbers; $20 to $30 billion.

Senator PROXMIRE. $20 to $30 billion? Do you think it would be feasible to use it in combination with some form of rationing?

Mr. STEIN. Yes, it could be.

Senator PROXMIRE. I presume how much we would bring in then would depend upon the kind of rationing you had, and how extensive the rationing was; is that right?

Mr. STEIN. As I said earlier, you can have a combination of conservation measures, price increases, taxes and rationing. I think there is a benefit in reducing the value of ration coupons.

Mr. SAWHILL. Another option, of course, Senator, would be to tax the incremental barrel, to have ration coupons and permit people to buy gasoline at the market price and then have a tax on top of that which would be imposed on gasoline that would be purchased without a coupon. So that would take less money out of the system.

Senator PROXMIRE. That would be a form of rationing, would it not?

Mr. SAWHILL. It would really be a combination of taxes and rationing.

Senator PROXMIRE. What economic impact would this have if the revenue from whatever tax is imposed, depending whether it is a combination of things—say, this raises $10 billion, what economic impact would it have if the revenue is used to increase the budget surplus or reduce the indebtedness?

Mr. STEIN. I think that if we get into numbers like that, we would have to give it back. At the least we would have to give most of it back or spend it. I don't think we would be in the position of wanting to increase the Federal surplus by $10 or $20 billion.

Senator PROXMIRE. Could it be used for things like mass transit and energy research and development?

Mr. STEIN. Yes, it could. I don't know whether you can reasonably spend $20 billion in the short run.

Senator PROXMIRE. How about refunding some of it through a temporary tax reduction?

Mr. STEIN. That is also a possibility.

Senator PROXMIRE. Public service?

Mr. STEIN. You could use some of it for that. I think that everybody who thinks of imposing a tax of such a magnitude must think of ways either to return it to the taxpayers or to spend it, not increase the surplus by that amount—which isn't to say that it might not be desirable to use some small amount of it.

Mr. SAWHILL. It seems to me, Senator, that you have identified three problems with the price-tax combination: One, the excess windfall profits; second, an income redistribution problem; and third, an inflationary problem.

Obviously, if you use only those two, you would have to find some way of thwarting these three problems that arise.

As far as income redistribution, you would have to develop some refunding mechanism, it seems to me, to insure that you didn't get a redistribution, in fact, as a result of whether a price or a tax or a combination of the two—we have already talked about the windfall profits, and I think the inflation thing might be handled through the budgetary process.

Senator PROXMIRE. For whatever it is worth, the reaction I have, that I have gotten from my constituents, is that while we would be very unhappy with rationing, it would make them uncomfortable, they would be more than unhappy, they would be infuriated with anything like a 30-percent price increase, whether a tax or just an increase. Their feeling is that this would be cruelly unfair to people of

modest incomes, farmers, workers, and others who have to drive distances to work, this is something that they would not stand for.

Mr. SAWHILL. I think that is true. You do have an income redistribution problem when you adopt only a price-tax option.

Senator PROXMIRE. You see, that income redistribution problem would be awkward, it takes time, it would be misunderstood by many people, and you could never get the redistribution in terms of users very well.

Mr. SAWHILL. I recognize that it is awkward and takes time.

Senator PROXMIRE. This is why rationing, grim as it is—and I would hope it would be imposed for as short a period as possible—does seem to represent an alternative that is going to be hard to resist unless we get more estimates such as we had yesterday that the shortage isn't as bad as we thought it was.

Mr. SAWHILL. Yes. Or unless our conservation measures prove more effective than we thought they would.

Mr. STEIN. It is going to be hard to resist because people have this idealized concept of rationing. As you have just stated, there is the problem of a person who lives far from work, or a farmer, or people who have special needs. Do you think that the rationing system or the ration board is going to determine all of these things?

As I remember, in World War II we let the farmer out entirely, at least the gasoline they got for running their tractors was available for other purposes. So they had no problem about it. I think in the early days of World War II the Members of Congress had it.

People think of the rationing program as something in which the Goddess of Justice is going to appear in every local courthouse and hand out the coupons. It isn't going to be done that way; it is going to be done by some ordinary bureaucrats down there, and people are going to be pretty unhappy about it. But nonetheless, I think there is a basic point, that the thing that we do here has to be something that will be accepted by the American people as fair, and you cannot disregard that.

Mr. SAWHILL. The fact is, we are going to have rationed gasoline, whether we have the price system ration it or the tax system ration it, or issue a coupon, or take other kinds of mandatory conservation measures to ration it, or just let it be rationed by gasoline stations. I think what we are all trying to do is find the most equitable way to do that and the way that will cause the least inequity and inconvenience.

Senator PROXMIRE. I have great sympathy with what you say. I think that we have to give a very high priority to production, and we have to see that the economy, especially the job priority, doesn't suffer. I would be very concerned that unless we have some kind of rationing, after a point, that the country is going to suffer greatly.

Mr. STEIN. I think so. The first determination, I think, is that we are going to make a deep cut in gasoline consumption. Then we have to do that in a way that is acceptable to the American people. If we don't make that deep cut, I think the economy is going to suffer.

Senator PROXMIRE. Mr. Sawhill, one of our later witnesses this morning assumes that if the cutback for industry is greater than 2 percent it will cut into unemployment. The admistration seems to

think a 10-percent cut should be absorbed through conservation by industry.

Do you have any real evidence for this assumption? The President has asked for a 10-percent cutback.

Mr. SAWHILL. We don't have any strong evidence. I think this 10-percent figure was derived from talking with a number of major corporations and asking them what they could do without cutting production. They felt that the 20-percent figure could be taken out of energy wastes primarily.

Senator PROXMIRE. One other question. I have had people come to me and say that we just don't have any good figures, and the Government figures are just way off on the storage of oil. I am not talking about the reserves. I am talking about the storage. We are told that the storage is about a billion barrels, or 55 days supply. But I am told that many farms and even small towns have storage squirrelled away in various ways that have not been recorded, that are not known, and that we don't have any reliable estimate as to what the storage is.

Mr. SAWHILL. I think that is correct. We don't have very good figures on storage.

Senator PROXMIRE. So it could be more than a billion barrels?

Mr. SAWHILL. It is conceivable, yes. We don't have good storage figures. We need that information. As I said previously, we will be coming back to the Congress asking for legislation which will enable us to get some of the figures that we don't have access to now.

Senator PROXMIRE. I would hope, Mr. Sawhill and Mr. Stein, that you would do everything possible to get better figures for the record. It is so hard for Congress and the administration and the public to know what to do or to accept what is being done when we have these figures that we can't count on. It is absolutely vital if you are going to make policy, if you go to rationing, or if you have a tax; if we do not have those figures—whatever we have to do to the oil companies to get them, subpena them or whatever, it seems to me that we should do it.

Chairman REUSS. Thank you very much, gentlemen.

I will have several additional written questions, Mr. Sawhill, which I will send to you, and I will appreciate your answering them for the record.[1]

We will now hear from Ms. Carter.

Ms. Carter, your prepared statement is received in full in the record, and we would like to have you proceed.

I believe you have been sitting here during the morning, and if there are any questions or answers or statements that have been made that you want to allude to, allude away.

STATEMENT OF ANNE P. CARTER, PROFESSOR OF ECONOMICS, BRANDEIS UNIVERSITY

Ms. CARTER. I think that since we have been at this all morning I would rather speak informally rather than read my prepared statement.

[1] See the response of Mr. Sawhill to additional written questions posed by Chairman Reuss, beginning on p. 192.

I have a rather lengthy prepared statement, and I hope that those of you who are interested in this problem will read it. I can't possibly summarize it all completely in 15 minutes.

I am, however, at an advantage as compared with Mr. Sawhill and Mr. Stein in that I speak only for myself, and therefore I can speak perhaps more frankly and speculatively than they would feel free to do.

I have a very serious message and a much more gloomy message than they had. My considered conclusion on the basis of a lot of computation—and we have been computing day and night for two weeks at Brandeis using a data base that built up over many years—is that even if the shortage is as low as 12 percent, which was the estimate in the President's statement a couple of weeks ago, we are in for very serious unemployment, I would say at least 3 percent over the 4.5 percent that we start with. If the shortage goes to 20 percent, I don't see how we can stay under 10 percent unemployment.

Furthermore, we can expect a doubling of energy prices, either in the form of taxes or in the form of just prices going up. And from the way the gasoline prices have gone up over a month, I can't see how there is going to be less than a hundred percent increase in the prices of coal, of oil, and of natural gas. I don't see how we can expect to add less than 8 percentage points to the annual rate of inflation. I will tell you in a while a little more about how we computed this.

We also computed how this would hit families at different income levels. And it turns out that the price increase will be very regressive. Families with incomes over $20,000 a year can expect a 7 percent increase in their cost of living; families with incomes under $8,000 a year can expect an increase of something like 12 percent in their cost of living. And this, to may way of thinking, is a major redistribution of income just because of the increase in prices.

Another point I want to make is that the kind of unemployment that we are talking about here is not the kind of unemployment that we are used to dealing with. We are used to dealing with the kind of unemployment that we correct through stimulating aggregate demand. This is the kind of unemployment that is due to shortages and we have dealt with it only in wartime, and then under very special conditions. The Keynesian remedies for stimulating aggregate demand are really quite inappropriate, either for estimating how much trouble we are in for here or for dealing with it. I don't say that they are useless, because I think they have to be used in addition to other methods, but they certainly don't give too much insight into the problems of unemployment that we face.

This doesn't mean that we don't know anything about it. We simply have to turn to different methods for estimating what our trouble is and what we may do about it. In particular I think that we need really quite detailed planning in order to make something acceptable out of this situation. I don't say we can make the unemployment vanish, but we can keep our country from disaster by planning in great detail. I notice that Mr. Stein has no faith in planning. I have more faith in planning than in doing nothing.

Now, let me turn to what I found specifically, because in the work of the last couple of weeks I have come to a rather striking conclusion, which is a sort of general principle on which I think we have to proceed. I certainly would not want to suggest that you take the details

in the tables attached to my prepared statement and go out there and set up little men who tell people to cut things by exactly these percentages. But the conclusion I come to really is that we do a lot better if we plan a balanced allocation of petroleum products among industries—and I will tell you what I mean by balanced in a little while—than if we implement across the board proportional cutbacks that say, all industries in class A get cut back 10 percent, and all industries in class B get cut back 25 percent, which was the nature of the original guidelines announced by the President.

Now, I would like to show you the kind of information base that I used in this work. I have brought an input-output table.[1] What these gentlemen are so kindly unrolling is an input-output table. Many of you are familiar with what an input-output table is. I just want to give you the general idea of what kind of information is in one. If you read along a row of this table it tells what each industry at a particular time sold to all other industries in the economy. And if you read up a column it tells what each industry bought from all other industries in the economy. Incidentally, these are put out as a regular part of the national accounts by the Bureau of Economic Analysis of the Department of Commerce. This one is about 100 order. They exist at 375 order, and I think you can disaggregate some sectors to get well over 450 order. An input-output table gives a detailed mapping of what industries depend on from each other in the American economy.

Now, let me just mention one other thing. We distinguish in an input-output table between two parts, the core of it, which we call intermediate sales—these are sales by industries to each other—and then the end part, which we call final deliveries or sales to final demand. These include sales to final consumers, sales to government—State, local, and Federal—gross private capital formation, and exports.

I can't go into the detailed mathematics of how one deals with this kind of information. But I think you can see intuitively that knowing how industries depend on each other is very important in planning a balanced allocation of petroleum products.

What we did in our computations is to simulate three scenarios. I will talk about only two because there are only two types. The first type is a proportional allocation. The first scenario is in accordance with the guidelines announced by the President late in November when he said he is going to cut back commercial sectors 25 percent and everybody else about 10 percent, except for consumers, who would be cut back 15 percent. That added up to a 12 percent cut, as he said in his talk.

The second scenario assumed a 20 percent cut, because I was told by one of the professional staff of the committee who outlined the needs of this session that a 20 percent cutback is really what we were talking about. I think my general conclusions will be very much the same if you say, okay, it is only 16 percent or 17 percent; qualitatively, conclusions lie in the same direction.

Assuming these proportional allocations, we estimated how much unemployment would be generated in various industries. We ask, if an industry is cut back 10 percent in the amount of oil it receives,

[1] Table prepared by the editors of Scientific American, Inc., entitled "The Input/Output Structure of the United States Economy."

what will this mean to the employment in the industry? We introduced cushion factors which varied by industry. We assumed commercial establishments could be cut back 10–15 percent and employment would be unaffected. We took into account the fact that in many industries the sector is not just dependent on oil, but uses alternative fuels. So whether an industry is cut back a lot or a little depends on the proportion of its energy requirements that are satisfied by oil. Obviously those that get much more of their energy from natural gas will be in relatively better shape, although I was told, again, to count on the 6 percent natural gas shortfall.

Finally, we have built in very generous allowances—we call them employment elasticities—for the cutback in employment that would come with a cutback in production. For most sectors, we assumed that if total energy was cut back by 1 percent, employment wouldn't be cut back by more than 0.7 percent. So we have really softened the impact; we made very generous allowances for what the impact of an oil deprivation would be on a sector. And there we came out with estimates that in the first round you would get approximately 8 percent unemployment due to the 20 percent oil shortage alone.

Now, the trick with this kind of proportional allocation is that some industries are cut back more than others, and this disturbs the balance among industries, because they supply each other's inputs. We used an input-output computation to show what some of the bottlenecks and what some of the shortages would be. And they were really appreciable.

A situation where you have serious bottlenecks can easily degenerate to a point where the entire economy is constrained by the most constrained industry; that is, the one that is cut back most can hold them all back because they can't get their vital inputs.

The range in unemployment goes from 8.3 percent, assuming bottlenecks don't matter at all, up to something like 14 percent if bottlenecks are taken seriously.

The other type of scenario that we computed is much more optimistic than that. There we took into account the idea that if there is going to be an oil shortage, some final deliveries are just going to have to be cut; there is no way out of it. The only question is, Do you cut them on purpose or do you let them be cut passively by cutting back the petroleum allocation? And so we examined the final demand sectors and looked for very energy-intensive components. Then we made up a program for cutting back those energy intensive components. I think that it would be a very useful exercise—more than an exercise, I can't think of a better word—but it would be a very useful thing for someone in the administration to figure out what energy intensive and labor nonintensive elements of final demand they really would be willing to cut back. In my prepared statement I have made my own tabulation. Then we computed the output level that would be required to support this cutback of final demand.

Finally, we computed an exact allocation of petroleum resources that would match that cut back final demand. Such an allocation avoids bottlenecks. Furthermore, the allocation is tilted in the direction of lower energy intensiveness and greater employment intensiveness. This computation resulted in only 6.3 percent unemployment, and presumably not much extra due to bottlenecks. We must recognize

that input-output isn't magic. There is going to be an awful lot of cutting and pasting to get the allocation right, and it can't all be done sort of mechanically out of a computer.

I have a couple of charts here to show you what we did. The first chart [1] that you are looking at is a comparison of the petroleum allocations under two scenarios, both representing a 20-percent oil shortage. The one line is, the cutbacks under the types of guidelines suggested by the President; that is, just across-the-board cutbacks for industry.

The other allocation—on the same chart—shows the computed allocation of petroleum under the controlled cutbacks in final demand. An interesting sidelight under the last scenario that we computed—the one with the controlled elements of final demand—we actually give extra oil to utilities and to the food industry, because otherwise they would be cutback too far by the shortage of natural gas to allow them to support their dependent industries.

The second chart [2] compares the total energy-to-labor content ratios in the various sectors of the economy.

Now, I do want to show you the third chart.[3] The third chart simply shows increases in the cost of living for different income groups due to price increases resulting from increased energy costs. The highest increase is for the lowest income group—under $8,000—the lowest increase is for the highest income group, the group over $20,000. You have two bars in each part. The first is for simply a doubling of petroleum product prices, and the second is for a doubling in the prices of all energy; that is, for natural gas and coal as well.

Let me just sum up what my conclusions are:

Clearly this will be a lot less gloomy a picture the more sharply consumers are cut back directly. A consumer who is a little colder will have a better chance of having a job. I don't see any way of accomplishing this quickly, except by rationing. And I think the sooner we do it the less trouble we will have in the employment situation.

I think a lot of steps have to be taken to redress the injustice, if you like, of the regressive impacts, both in terms of the cost of living and in terms of unemployment. I mean, it is the unemployed after all who are going to be hit by these lopsided price increases.

And the third one is that I don't think we can afford to delay a moment longer starting to draw up plans that will ease the situation as much as we possibly can.

Thank you.

[The prepared statement of Ms. Carter follows:]

PREPARED STATEMENT OF ANNE P. CARTER

PETROLEUM ALLOCATIONS AND UNEMPLOYMENT

1. INTRODUCTION AND SUMMARY

I have been invited to present an input-output [4] analysis of the impact of the oil embargo on U.S. industry. This impact will depend, of course, on the size of the overall petroleum deficit, on supplies of energy from other sources and on

[1] See fig. 3, p. 4.
[2] See fig. 2, p. 48.
[3] See fig. 6, p. 48.
[4] Leontief, W. W. *Input-Output Analysis*, Oxford University Press, New York, 1966.

how fuels are allocated. At best, the consequences for production and employment will be serious. Without a well-balanced allocation scheme, promptly and strictly enforced, the consequences will be nothing short of disastrous. To demonstrate the importance of rationally planned allocation I have chosen three hypothetical but plausible allocation schemes and estimated the resulting cutbacks in sectoral employment and final deliveries.

1. The first consists of a literal application of the broad guidelines for cutbacks announced by the President two weeks ago. Under optimistic assumptions it will entail a three percentage point increase in unemployment, bringing the national total to at least 7.5 percent. But as the President noted, these cutbacks would compensate for only a 12 percent oil deficit.

2. The second allocation scheme is administratively similar to the first but contains proportionally larger petroleum cutbacks sufficient to cover an expected deficit in the neighborhood of 20 percent. It will boost national unemployment levels by at least 8 percent and probably much higher. Since some sectors rely on substitute fuels more than others, proportional oil allocations can easily lead to "bottlenecks," particularly when the cutbacks are large.

3. The third scheme also assumes a 20 percent shortage. It entails planned reductions in selected elements of final demand that are energy-intensive but not labor-intensive. Sectoral allocations of petroleum products required to sustain the specified final deliveries are estimated by input-output methods. Because this allocation provides for necessary intermediate and final deliveries, bottlenecks are averted. Waste of energy is kept to a minimum, and resulting unemployment, while still a substantial 6.3 percent, is lower than under Scenario II.

The final section of this report concerns the impact of the proposed increases in energy prices on all other prices and on the cost of living for families at various income levels. A 100 percent tax on energy use is likely to add at least 8 percentage points to the present rate of inflation. It would raise consumer prices by 7 percent for those with incomes over $20,000 and by more than 12 percent for those with incomes under $8,000.

While sound allocation policy can prevent disaster, the oil shortage will inevitably bring greater unemployment and inflation. Both affect the lowest income groups most heavily. Measures to minimize the burden and to distribute it equitably must include tax reform and income supplements, but a discussion of these programs is beyond the scope of this report.

2. PETROLEUM SHORTAGES AND SECTORAL PRODUCTION: ASSUMPTIONS

The critical question is how specific petroleum cutbacks will affect employment and output in various industrial sectors. Were we to read observed input-output ratios strictly as "requirements" the outlook would be bleak: if major commercial and service sectors curtailed their activities and employment in strict proportion to the 25 percent reduction in their petroleum consumption the consequences would be catastrophic. In addition to direct unemployment in these sectors (they employ more than half of the U.S. workforce) layoffs would be triggered in numerous other industries that depend on the commercial sectors for essential services.

The input-output coefficients of a real economy are not always rigidly fixed and our computations allow for a certain amount of flexibility. In some sectors like trucking and petrochemicals there is no substitute for petroleum in the short run. In other sectors, like electric utilities, food processing and pulping mills, the same processing functions are performed alternatively by oil, natural gas and, to some extent, by coal or electric power. Depending on historical and geographical circumstances, individual plants with similar outputs are at present committed to different energy sources. Some pulp mills rely on oil, others on natural gas. Since all fuels are in short supply, fuel switching by individual plants will probably be negligible this year. Nevertheless, the effect of petroleum shortages on a sector's performance will be mitigated where other fuels contribute a substantial proportion of its energy requirements. The food sector, for example, gets 41 percent of its energy from natural gas. In estimating its response to the oil embargo, we assume that only 28 percent of its BTU requirements must be supplied by petroleum products.

Most sectors can adapt to the energy shortage by eliminating waste or by making emergency cuts in room temperatures and lighting without reducing output significantly. Since no one knows exactly how large those adaptations will be, we made crude allowances for potential energy savings. It is reasonable to expect, for example, that most stores and service establishments can absorb a 15 percent

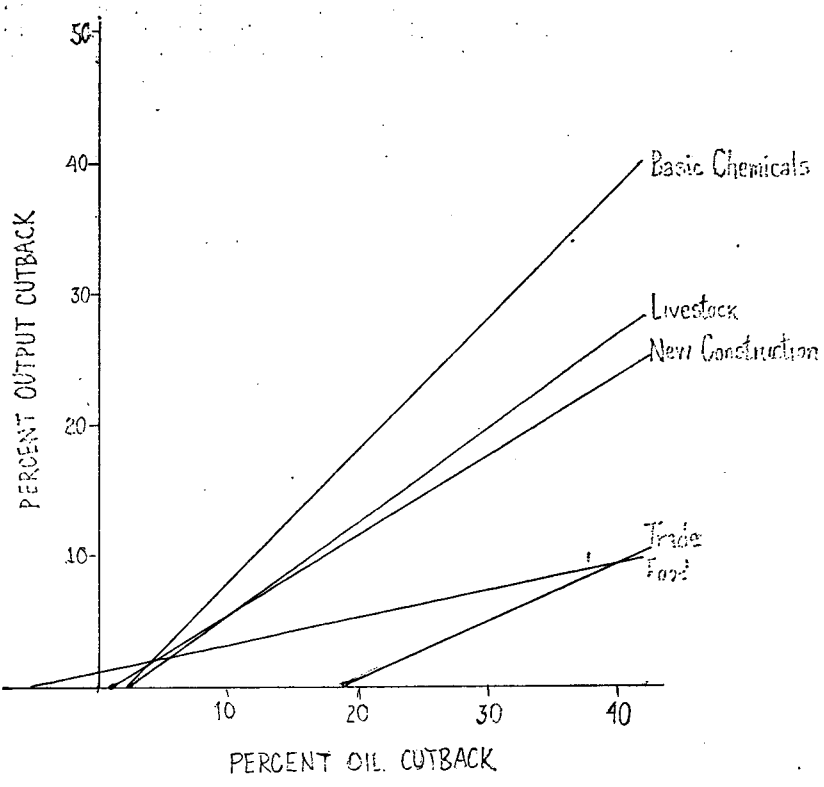
cut in heating fuels without appreciably curtailing activity or employment. Energy requirements for industrial processes and transportation are harder to trim and we allowed only a two percent cushion factor in the use of process energy for industrial users.

Since (i) cuts in overtime generally precede layoffs and (ii) supervisory personnel are retained as output falls, reductions in employment tend to lag behind reductions in output in the short run. We assume that sectoral employment will fall only .7 percent for every one percent cut in sectoral output due to petrolem shortages. For trucking, reduced speeds are assumed to produce not only a two percent savings of fuel but also a ten percent increase in labor required per unit of output.

Figure 1 shows the specific relationships between oil and output cutbacks for a few sectors in the model. The slopes of the lines represent percentage changes in output per one percent change in petroleum. Most of the slopes are less than one because we assumed that petroleum is not the only energy source. The X-intercepts are positive for most sectors because they can reduce energy consumption by some percentage without reducing output: A few sectors, like food, which use a large proportion of natural gas have negative X-intercepts. Because of the six percent natural gas shortage they require more petroleum than before to sustain their output levels. This analysis could be substantially improved were more time and information available for refining assumptions about adaptation.

FIGURE 1

Relationships between Oil and Output Cutbacks



The first two scenarios represent the same general type of petroleum allocation. Both assume the Administration's present approach: uniform proportional reductions in petroleum deliveries for industrial process use and higher uniform reductions for commercial and service sectors and for industrial space heating. Proportional cutbacks for across-the-board groups of sectors are politically palatable because they seem "fair" and "objective" but they can lead to serious economic imbalance. If a given percentage reduction in petroleum were to reduce all sectors' output by the same proportion, then the across-the-board cutbacks would simply reduce all production and final deliveries proportionally: all outputs would be lower but the proportions of goods consumed by intermediate and final users would remain the same. Actually, however, a ten percent cutback in petroleum will curtail some sectors' production more than others because some

sectors rely on substitute energy sources more than others. When petroleum deliveries are reduced uniformly, output reductions are far from uniform.

When sectoral outputs are not curtailed proportionally, certain products become scarce while others become redundant. If the output of chemicals is cut severely relative to the outputs of most industrial consumers of chemicals, then some intermediate or final demands may have to go unsatisfied. A shortage of chemical inputs will probably force intermediate users of chemicals to produce less. Alternatively, some shortages might be compensated by reductions in final consumption. A fertilizer shortage that threatens agricultural production might conceivably be met by a reduction in the fertilizer consumption of amateur gardeners; a shortage of cloth for the apparel industry could be averted by a cut in exports of textiles. The degree to which shortages in intermediate products can or should be compensated by cutting back final deliveries will generally be limited.

Even when reductions in final deliveries can compensate for shortages in intermediate deliveries they are likely to entail major distortions of original final demand proportions. They lead to a situation where pepole are expected to buy, say, relatively more automobiles and less food at a time when they may not choose to do so. Price changes may induce them to buy more of some items and less of others, but the demand for many final consumer and producer goods is relatively inelastic.

Starting with 1972 final demand, we computed what would happen under proportional oil allocation assuming that intermediate requirements would be satisfied first, if necessary, by cutting back final deliveries. In some instances we found that it simply couldn't be done. For example, a more than one hundred percent cutback in final demand would be needed to compensate for the shortage of steel under Scenario II. Even where it might be feasible, one can certainly question the desirability of imposing radical changes in patterns of final consumption in order to render an across-the-board petroleum cut workable. If final demand is not sufficiently curtailed bottlenecks will ensue causing further reductions in output and final deliveries.

Under Scenario III, certain elements of final demand are deliberately reduced to save oil. These adjustments affect some sectors' outputs, and hence their oil requirements, relatively more than others'. To the extent that the demand for some sectors' products falls, their demand for petroleum is curtailed automatically. The resulting cutbacks in oil consumption are not uniform but they are balanced. Sectoral production is sufficient to meet the newly revised final demand and all the intermediate requirements associated with it. Policies that reduce selected energy-intensive elements of final demand are essential to an efficient oil allocation program.

SCENARIO I

The first scenario is based on a 12 percent shortage of petroleum products. It assumes that petroleum products are allocated proportionally among potential industrial and final consumers according to guidelines announced by the President on November 25, 1973. These guidelines called for the following cutbacks:

	Percent
Space heating for final consumers	15
Gasoline for private automobiles	15
Space heating for commercial and industrial users	25
Industrial use	10

Restrictions on oil supplies of other important users were not made specific in the original announcement, but recent developments seem to justify the following cutbacks:

	Percent
Air travel	25
Transportation other than by air and private automobile	10
Utilities	10

In addition, we assume an overall shortage of six percent in natural gas supplies, and coal supplies just sufficient to meet the operating requirements of capacity already committed to coal. The impact of oil cutbacks on coal mining operations is neglected.

The computed effects of these cutbacks are shown in Tables 1 and 2. Table 1 (column 1) gives percentage reductions in employment. The amount of each sector's products available to final users—consumers, government, households,

gross capital formation and exports—was computed by an input-output computation. Table 2 shows how much deliveries to final consumers would have to fall below pre-shortage levels to insure that intermediate demands can be satisfied. These shortages of products are shown both as percentages of initial final deliveries and as percentages of initial output. For a few sectors the "reductions" in final deliveries are negative. Even with curtailed production, these sectors can fully satisfy all intermediate demand, and have more than enough output left to satisfy initial final demand. This happens because the industrial users of these products are more sharply affected by the oil shortage than are the producing sectors themselves. One might expect that at least part of this "slack" output would not actually be produced. In the case of sector 36, stone and clay products, for example, it is difficult to imagine how an excess of 68 percent in final deliveries could be sold. A four percent slack in textiles (sector 16), on the other hand, might easily be absorbed by increased consumer purchases, particularly since other types of spending may be frustrated by scarcities.

TABLE 1.—PERCENT UNEMPLOYMENT DUE TO THE ENERGY SHORTAGE[1]

	Scenario—				Scenario—		
	I	II	III		I	II	III
1. Livestock	0.06	0.10	0.01	41. Stampings, etc	.04	.06	.11
2. Crops	.06	.10	.01	42. Hardware	.03	.05	.11
3. Forestry and fishing	.06	.10	.07	43. Engines and turbines	.03	.05	.08
4. Agricultural services	.06	.10	.02	44. Farm equipment	.02	.03	.11
5. Iron mining	.06	.10	.09	45. Construction and mining equipment	.02	.04	.09
6. Nonferrous mining	.06	.10	.10	46. Materials handling equipment	.03	.05	.13
7. Coal mining				47. Metalworking equipment	.04	.07	.12
8. Petroleum mining				48. Special industrial equipment	.04	.07	.10
9. Stone and clay mining	.06	.10	.14	49. General industrial equipment	.03	.05	.11
10. Chemical mining	.06	.10	.04	50. Machine shop products	.04	.06	.11
11. New construction	.05	.09	.26	51. Office and machinery comp	.03	.06	.09
12. Maintenance construction	.05	.10	.03	52. Service industrial machinery	.05	.10	.12
13. Ordnance	.03	.05	.05	53. Electric apparatus	.03	.05	.11
14. Food	.03	.04	.01	54. Household appliances	.02	.03	.05
15. Tobacco	.01	.02	0	55. Lighting and wiring equipment	.04	.06	.12
16. Fabrics, yarn	.03	.04	.02	56. Communication equipment	.05	.08	.07
17. Carpets and miscellaneous	.02	.03	.06	57. Electronic equipment	.05	.07	.07
18. Apparel	.04	.07	.01	58. Batteries, etc	.03	.04	.10
19. Other textile products	.03	.06	.05	59. Motor vehicles and equipment	.02	.03	.23
20. Wood and products	.04	.07	.13	60. Aircraft	.04	.07	.07
21. Wooden containers	.04	.06	.05	61. Trains, ships, etc	.03	.06	.09
22. Household furniture	.03	.05	.04	62. Instruments, etc	.04	.06	.07
23. Office furniture	.02	.03	.12	63. Photographic apparatus	.02	.04	.05
24. Paper and products	.02	.03	.04	64. Miscellaneous manufactures	.05	.08	.04
25. Paper boxes	.04	.06	.04	65. Transportation	.07	.09	.09
26. Printing and publishing	.04	.07	.03	66. Telephone	.02	.09	.04
27. Basic chemicals	.06	.10	.07	67. Radio and TV broadcasting	0	.02	.05
28. Synthetic materials	.06	.10	.09	68. Utilities	.05	.07	.04
29. Drugs, soaps, etc	.06	.10	.02	69. Trade	.02	.09	.04
30. Paint	.06	.10	.13	70. Finance and insurance	0	.03	.02
31. Petroleum refining				71. Real estate and rental	0	.03	.02
32. Rubber products, etc	.02	.04	.12	72. Hotels, personal services	.03	.10	.16
33. Leather tanning	.02	.04	.02	73. Business services	0	.05	.06
34. Shoes	.04	.07	.01	75. Auto repair	.03	.11	.13
35. Glass and products	.03	.03	.07	76. Amusements, etc	0	.05	.01
36. Stone and clay products	.02	.02	.18	77. Institutions	0	.06	.01
37. Iron and steel	.05	.10	.13	78. Federal Government enterprises	0	.07	.03
38. Nonferrous metal	.04	.05	.11	79. State and local government enterprises	.03	.05	.04
39. Metal containers	.05	.08	.02				
40. Heating, etc	.04	.06	.18				

[1] This does not include unemployment induced by bottlenecks or by reductions in consumer purchases due to direct unemployment.

TABLE 2.—PERCENTAGE REDUCTIONS IN FINAL DELIVERIES UNDER 3 SCENARIOS

	Percent of sectoral output			Percent of sectoral final delivery		
	I	II	III	I	II	III
1. Livestock	3.4	6.5	0	48.1	92.2	0
2. Crops	4.4	7.7	0	13.5	23.8	0
3. Forestry and fishing	3.6	7.3	0	14.3	29.1	0
4. Agricultural services	.6	.5	0	35.1	23.6	2.6
5. Iron mining	1.7	3.4	0	9.4	18.6	0
6. Nonferrous mining	2.4	5.7	.9	31.6	74.2	11.6
7. Coal mining	3.0	6.2	.1	12.9	26.5	.4

TABLE 2.—PERCENTAGE REDUCTIONS IN FINAL DELIVERIES UNDER 3 SCENARIOS—Continued

	Percent of sectoral output			Percent of sectoral final delivery		
	I	II	III	I	II	III
8. Petroleum mining						
9. Stone and clay mining	2.8	5.7	0	134.3	268.0	.7
10. Chemical mining	2.7	4.8	0	9.0	16.2	0
11. New construction	7.7	13.4	37.9	7.7	13.4	37.9
12. Maintenance construction	6.5	9.0	.4	18.5	25.4	1.2
13. Ordnance	4.0	6.4	5.5	4.4	7.0	6.0
14. Food	2.8	4.0	0	4.0	5.7	0
15. Tobacco	1.1	2.2	0	1.5	3.0	0
16. Fabrics, yarn	−.4	−.7	0	−4.1	−6.3	.3
17. Carpets and miscellaneous	.2	−.2	.4	.6	−.7	1.4
18. Apparel	4.7	7.6	0	6.1	9.9	.1
19. Other textile products	2.9	4.3	.3	5.7	8.4	.5
20. Wood and products	.4	0	0	5.6	0	.2
21. Wooden containers	.4	−1.3	.1	19.2	−61.4	5.2
22. Household furniture	2.5	4.5	7.	3.2	5.8	.9
23. Office furniture	2.2	2.7	12.9	2.8	3.4	16.1
24. Paper and products	−1.2	−2.4	0	−7.0	−14.1	.1
25. Paper boxes	.9	−.1	0	17.9	−1.6	.5
26. Printing and publishing	5.4	4.6	0	22.3	19.3	.1
27. Basic chemicals	2.9	5.1	.6	12.5	22.3	2.5
28. Synthetic materials	4.4	8.2	.1	27.5	51.8	.5
29. Drugs, soaps, etc	6.8	11.3	.1	9.6	15.9	.1
30. Paint	1.9	3.5	0	43.7	80.2	.2
31. Petroleum refining						
32. Rubber products, etc	−.5	−1.4	6.8	−1.8	−5.3	26.0
33. Leather tanning	−1.2	−2.2	0	−15.1	−26.7	.1
34. Shoes	5.0	8.3	0	5.8	9.6	0
35. Glass and products	.2	−1.8	0	.8	−9.7	.2
36. Stone and clay products	−3.7	−7.4	0	−67.9	−136.4	.2
37. Iron and steel	2.5	4.7	0	59.6	113.2	.6
38. Nonferrous metal	.8	.5	1.4	4.9	3.0	3.4
39. Metal containers	2.0	3.4	.1	81.0	136.8	5.3
40. Heating, etc	−.9	−2.8	1.6	−6.6	−20.5	11.8
41. Stampings, etc	1.4	1.6	.1	10.4	12.1	.4
42. Hardware	.3	−.3	.6	1.9	−1.8	3.8
43. Engines and turbines	2.0	3.3	3.6	4.2	7.0	7.6
44. Farm equipment	1.2	1.5	12.9	1.6	2.0	17.2
45. Construction and mining equipment	1.7	2.7	8.6	2.3	3.5	11.4
46. Materials hand, equipment	1.5	2.0	10.2	2.7	3.6	18.4
47. Metalworking equipment	3.8	6.2	7.7	7.9	12.9	16.1
48. Special industrial equipment	4.6	7.2	11.6	6.2	9.7	15.5
49. General industrial equipment	1.8	2.6	5.7	4.5	6.4	14.0
50. Machine shop products	1.3	1.3	.3	15.0	14.7	2.9
51. Office and machine comp	3.8	6.1	9.2	5.4	8.6	13.0
52. Service industrial machinery	5.3	8.8	7.5	9.3	15.5	13.2
53. Electric apparatus	1.4	1.5	6.9	3.1	3.4	15.3
54. Household appliances	.6	.1	.6	1.0	.1	.9
55. Lighting and wiring equipment	.1	−.6	.4	.4	−2.8	1.8
56. Communication equipment	5.3	8.9	7.0	7.3	12.4	9.8
57. Electronics equipment	2.3	3.0	1.5	8.5	10.8	5.6
58. Batteries, etc	.9	−.1	2.3	2.4	−.2	5.8
59. Motor vehicles and equipment	1.5	2.3	21.4	2.5	3.8	35.6
60. Aircraft	4.0	6.4	7.1	6.2	10.1	11.2
61. Trains, ships, etc	3.7	6.2	11.0	4.8	7.9	14.0
62. Instruments, etc	3.1	3.8	3.8	5.9	7.3	7.4
63. Photo apparatus	2.0	2.9	4.0	3.1	4.5	6.3
64. Miscellaneous manufactures	4.9	7.4	1.3	8.6	12.9	2.3
65. Transportation	5.0	9.0	3.3	11.9	21.6	7.8
66. Telephone	1.3	8.1	1.2	2.7	16.5	2.4
67. Radio and TV broadcasting	−2.3	−3.7	0	−50.7	−83.7	0
68. Utilities	3.2	2.5	.2	8.1	6.4	.5
69. Trade	1.6	10.4	1.2	2.3	14.7	1.6
70. Finance and insurance	−2.6	.6	0	−5.0	1.2	0
71. Real estate and rental	−3.1	.5	.3	−4.9	.7	.5
72. Hotels, personnel service	3.6	13.6	20.3	4.4	17.0	25.3
73. Business service	−3.2	−.3	.5	−14.8	−1.2	2.5
75. Auto repair	2.7	11.5	14.5	4.7	19.9	25.0
76. Amusements, etc	−.4	4.5	.2	−.5	7.1	.3
77. Institutions	−.1	7.5	.3	−.1	7.9	.4
78. Federal Government enterprises	4.5	2.5	.2	18.3	10.4	.7
79. State and local government enterprise	.7	−1.3	0	4.3	−7.7	.1

Shortages of particular intermediate goods, however, cannot always be averted by reductions in their sales to final consumers. Can the shortages of steel (sector 37) be made up by imports or by a reduction in exports? Or will they entail bottlenecks that further limit the outputs and employment of steel-consuming sectors? The answers to such questions are industry-specific. They depend on the flexibility of capacity with respect to changes in product mix and

on geographical and other conditions. Since the slacks and shortages that develop under Scenario I are relatively small, we assume, probably over-optimistically, that they do not induce secondary cutbacks in other sectors. The general problem of bottlenecks becomes more serious under Scenario II, where it is discussed more fully.

Unemployment estimates in Table I are quite conservative since they (i) ignore the threat of bottlenecks, (ii) assume that final deliveries in excess of initial final demand can be sold to final users, and (iii) ignore the negative feedback effects of direct unemployment on consumer demand. It is unlikely that these second-order reductions in consumer purchases would neatly cancel the bottlenecks due to the petroleum cutbacks, the two phenomena would affect different products in different proportions.

SCENARIO II

For the second scenario we increased the cutbacks implied by the President's guidelines by a factor of 1.67 to cover a 20 percent (rather than the original 12 percent) petroleum shortage. Sectoral petroleum cutbacks are 41 percent for services and trade, 16.7 for process energy in all others. First-round effects of these cutbacks on employment and on computed final deliveries are shown in the second column of Table 1 and the second and fifth columns of Table 2, respectively. The energy shortage now reaches beyond all the cushion factors and every sector is forced to reduce employment. Layoffs vary from around 10 percent in heavily oil-dependent industries to as little as 2 percent in sectors that rely on other energy sources. Average unemployment due to the oil shortage now amounts to 8.3 percent.

Even this gloomy estimate is unrealistically low because the shortages and surpluses that result from this allocation are serious. For example, shortages of transportation (sector 65) and of plastics (sector 28), shown in Table 2, amount to 8 or 9 percent of those sectors' initial outputs and constitute 22 and 52 percent of final deliveries, respectively. They are too large to be absorbed by unplanned final demand adjustments. Bottlenecks induce successive reductions in production and employment. When petroleum feedstocks are inadequate, chemicals are cut; when chemicals are cut, plastics are cut; when plastics are cut, automobiles are cut; and so on.[1] Transportation constraints rapidly limit the activities of all sectors.

One can only speculate about total unemployment induced by bottlenecks because it depends on how the scarce chemicals, transportation, etc., are themselves allocated among their potential users. If shortages are borne proportionally among intermediate users, all sectors will approach the largest percentage cutback sustained by the most restricted sector—in our example, close to 10 percent! When petroleum is not properly allocated in the first place, shortages may warrant controlled allocation of many other intermediate products as well.

Reductions in consumer demand induced by direct unemployment are also likely but we have not estimated them. The picture is alarming enough to recommend that we seek an alternative approach.

SCENARIO III

The third scenario assumes the same direct cutbacks of petroleum to households and hence the same initial shortfalls as Scenario II. In this case, however, bottlenecks are avoided through a two-pronged approach. First, since petroleum is insufficient to satisfy pre-shortage final demand, some cutbacks in final deliveries cannot be avoided. Rather than reducing final delivery changes from a predetermined industrial allocation, we plan a program of reductions that purposely discriminates against products that are energy-intensive rather than labor-intensive. Second, by an input-output computation, we estimate the levels of sectoral outputs required to deliver the revised final bill of goods and deduce the demand for petroleum from the new output levels. Because output levels are just sufficient to satisfy final demand, bottlenecks are avoided and no fuels are wasted in the production of goods that will not be bought.

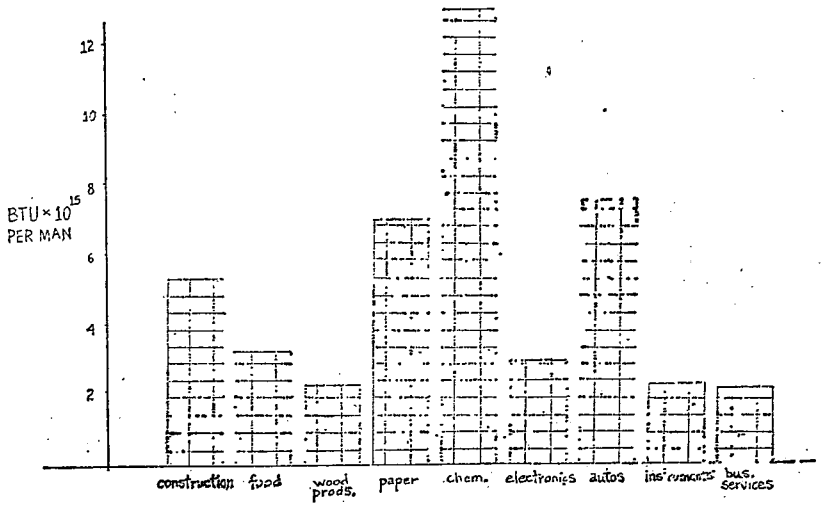
Figure 2 illustrates an informational basis for deciding what final items to cut back. For selected final goods it shows the ratio of total (direct plus indirect) energy to total labor in units of 10^{15} BTU's per man year. Other things equal,

[1] Hegeman, George and Vince Piccaglia, "United States Petrochemical Industry Impact Analysis." Arthur D. Little, Inc., Cambridge, 1973.

there will be less unemployment for a given energy deficit if items with higher total energy-to-labor requirements are cut back. Of course, reductions in some areas like food production might impose greater hardship to consumers than reductions in others. Furthermore, severe curtailment of a single industry might concentrate the burden too heavily on a particular group. The choice of a reasonable set of reductions in final deliveries involves judgment about social priorities and should not be formed mechanically.

FIGURE 2

Total Energy-to-Labor Content Ratios



A hypothetical program of final delivery curtailment is cited in Table 2, column 6. It is made up of the following reductions:

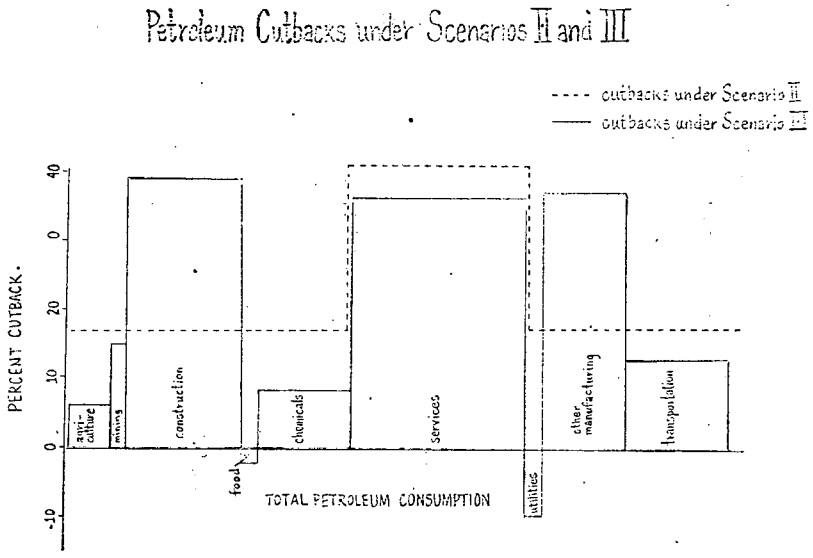
	Percent
Gross private capital formation	25
Federal defense expenditures	25
State and local and Federal new construction	40
Automobiles	30
Automobile and travel services	25
Transportation (one fourth of consumer air travel)	6

State and local government construction was singled out because it is very energy-intensive, because it includes a lot of highway construction that should be reconsidered now, and because it can be reduced by direct administrative action. Gross capital formation contains many energy-intensive products. Certainly 25 percent of private investment can be postponed in time of national emergency. The business climate will tend to discourage new investment in many areas anyway. If necessary, Federal action can discourage it further by emergency regulation. Reductions in automobile demand also seem to be taking place spontaneously. Cutbacks in defense expenditures are worth considering on many grounds. Finally, the last two items on the list result automatically from announced restrictions on private automobile and air travel. This set of cutbacks is only one of many possible energy-saving programs. Alternative programs should certainly be considered.

Using our input-output model we computed the reductions in sectoral outputs and employment that would result from the planned curtailment of final demand. The percentage cutbacks in employment are shown in column 3 of Table 1 and in Figure 3. The overall employment rate due to the oil shortage is well below

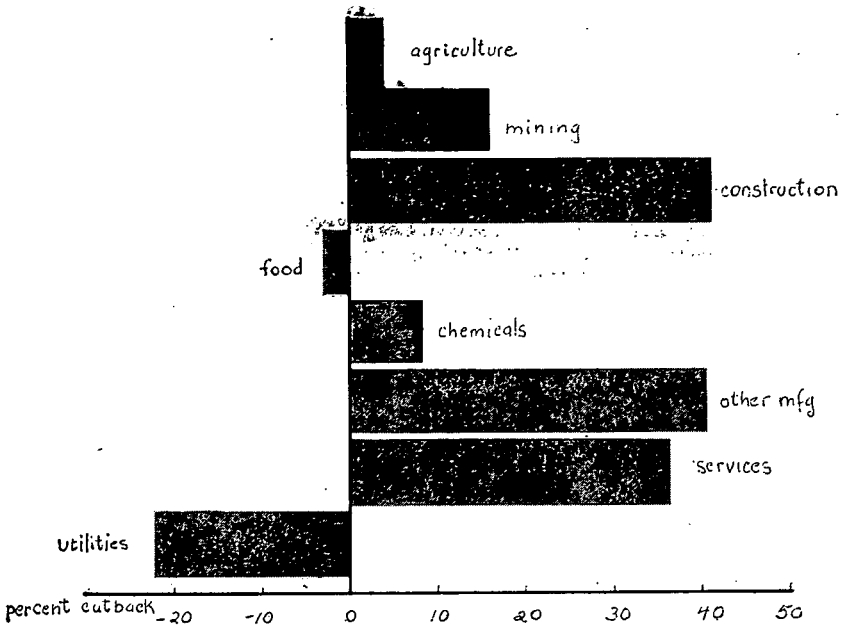
7 percent, as compared with something between 8 and 10 percent under Scenario II. Unemployment is particularly high in construction as compared with other sectors; there may be some solace in its wide geographical dispersion. Although new construction is reduced, maintenance construction is sustained at a high level. Since outputs are sufficient to cover intermediate and final demands, serious bottlenecks are averted.

FIGURE 3



On the basis of computed reductions in output, petroleum cutbacks by individual sectors were computed from equations of the type pictured in Figure 1. Each sector's allotment depends on its output level, its cushion factor, its initial use of substitute fuels. Estimated reductions in petroleum consumption under Scenarios II and III are compared. Total energy cutbacks are the same under the two scenarios but individual sectors are affected differently. Under Scenario III, "negative cutbacks" occur in the food and utilities sectors. They must receive more than their initial consumption in order to make up for the six percent shortage of natural gas.

An input-output computation can provide guidelines for the industrial allocation of scarce petroleum. To implement a program requires a great deal of wise technical and administrative judgment as well. Reducing final demand will automatically curtail consumption in many sectors but administrative measures will still be necessary to reduce industrial consumption for space heating and lighting and to force all sectors to eliminate waste wherever possible.



PETROLEUM ALLOCATION WITH REDUCED FINAL DELIVERIES

FIGURE 4

PRICES

The cost per barrel of oil and per gallon of gasoline to intermediate and final consumers is likely to double within the next few months. Steep increases in petroleum taxes have been proposed. Alternatively, prices of energy may be allowed to rise to double or more with increased profits to the oil industry. Indeed, they have already risen sharply in the past few months.

How will other prices be affected? Using a standard input-output price computation, we estimated the effects on all sectors' prices of a 100 percent tax on refined petroleum products. In a second computation we estimated the effects of 100 percent taxes on all basic energy sources: on coal and on natural gas as well as on petroleum products. The estimates assume that wages and profits in each sector remain unchanged. Alternative assumptions could be built into the computations, but they probably would not significantly alter the thrust of the conclusions.

Computed price changes are listed in detail in Table 3. In column 2, they range from 14 percent for basic chemicals (27) which has a very high direct and indirect energy requirement to 1.3 percent for radio and tv broadcasting (67). Figure 5 summarizes the price changes over broad industrial groups. As might be expected, prices of construction and maufactured products rise more than those of service sectors, which are labor-intensive. For many years labor saving has been the key to successful enterprise in the American economy. These price changes may well shift the focus to energy saving.

FIGURE 5

Price Increases due to 100 Percent Taxes on Fuels

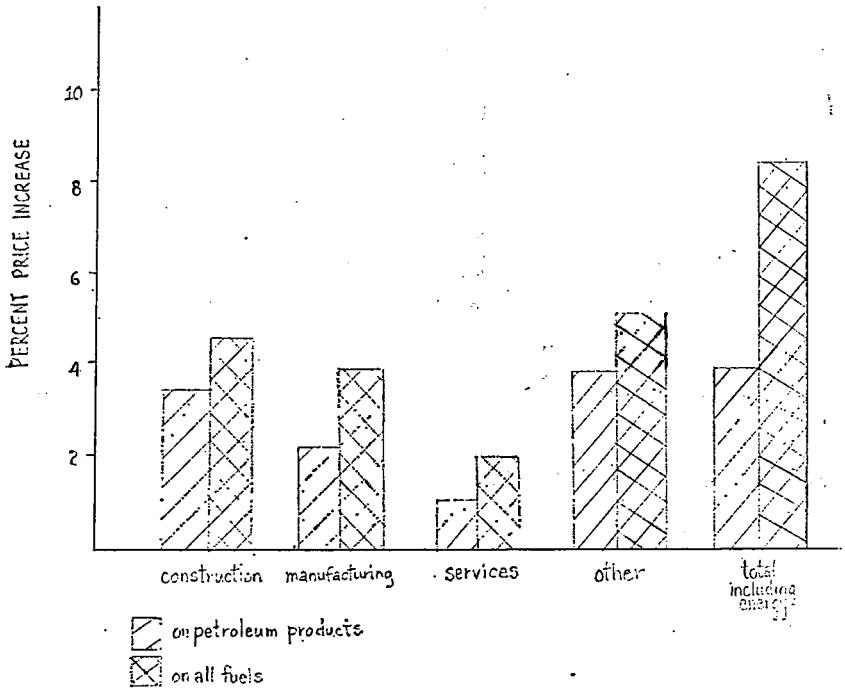


TABLE 3.—PERCENTAGE PRICE INCREASES WITH 100 PERCENT ENERGY TAXES

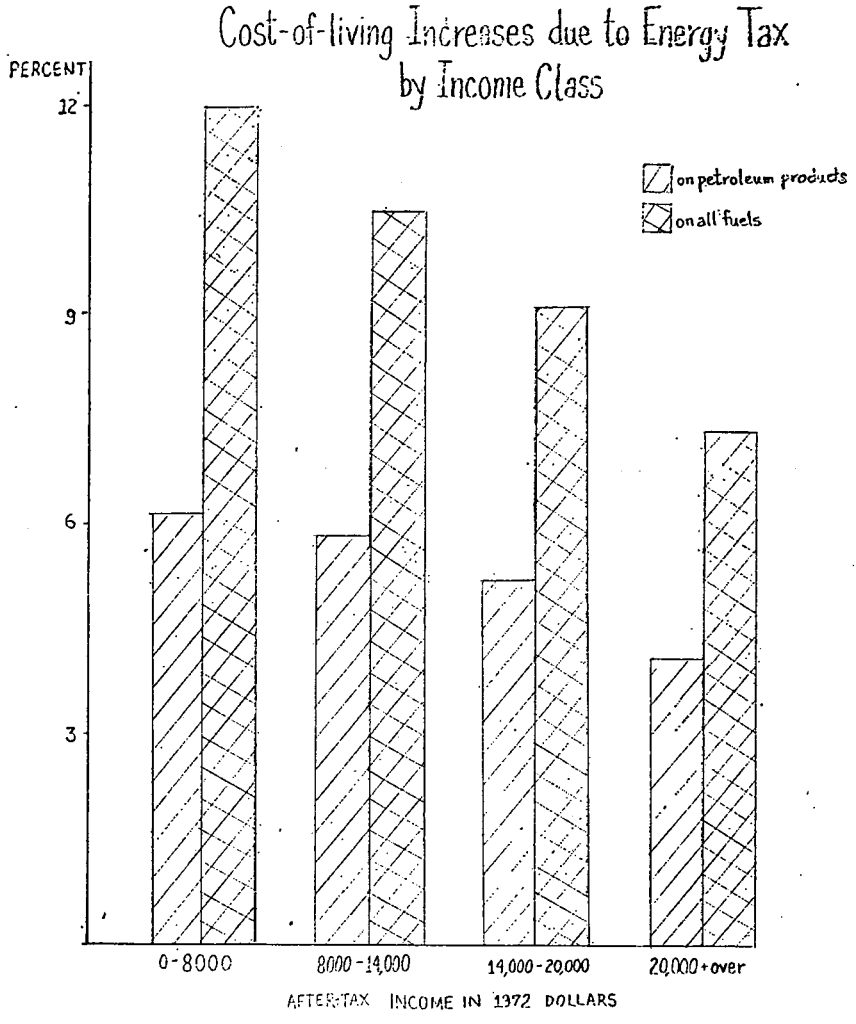
	With tax on—	
	Petroleum products	Coal, oil and gas
1. Livestock	3.5	4.4
2. Crops	5.2	6.1
3. Forestry and fishing	3.4	3.9
4. Agricultural services	2.8	3.5
5. Iron mining	1.8	3.5
6. Nonferrous mining	1.6	3.5
7. Coal mining	1.8	[1] 121.5
8. Petroleum mining	1.3	2.3
9. Stone and clay mining	3.7	6.0
10. Chemical mining	1.9	6.3
11. New construction	3.2	4.6
12. Maintenance construction	4.1	5.1
13. Ordnance	1.1	2.1
14. Food	2.5	3.7
15. Tobacco	1.4	1.9
16. Fabrics, yarn	2.7	4.4
17. Carpets and miscellaneous	2.6	4.1
18. Apparel	1.5	2.5
19. Other textile products	2.0	3.3
20. Wood and products	2.0	2.9
21. Wooden containers	1.6	2.8
22. Household furniture	1.6	2.7
23. Office furniture	1.5	3.1
24. Paper and products	2.5	5.3
25. Paper boxes	2.4	4.2
26. Printing and publishing	1.5	2.6
27. Basic chemicals	9.4	14.0
28. Synthetic materials	5.9	9.0
29. Drugs, soaps, etc	2.6	4.1
30. Paint	7.8	9.8
31. Petroleum refining	[1] 109.5	[1] 112.0
32. Rubber products, etc	2.3	4.0
33. Leather tanning	2.3	3.9
34. Shoes	1.3	2.3
35. Glass and products	1.6	6.1
36. Stone and clay product	2.8	7.3
37. Iron and steel	2.0	7.5
38. Nonferrous metal	2.1	4.7
39. Metal containers	1.7	4.8
40. Heating, etc	1.6	4.0
41. Stampings, etc	1.6	3.7
42. Hardware	1.6	3.8
43. Engines and turbines	1.5	3.1
44. Farm equipment	1.4	3.3
45. Construction and mining equipment	1.4	3.3
46. Materials handling equipment	1.5	3.1
47. Metalworking equipment	1.3	2.8
48. Special industrial equipment	1.7	3.2
49. General industrial equipment	1.6	3.3
50. Machine shop products	1.1	2.6
51. Office and machinery comp	.9	1.6
52. Service industrial machinery	1.5	3.2
53. Electric apparatus	1.6	3.1
54. Household appliances	1.5	3.3
55. Lighting and wiring equipment	2.3	3.9
56. Communication equipment	1.0	1.8
57. Electronic equipment	1.3	2.6
58. Batteries, etc	1.3	2.7
59. Motor vehicles and equipment	1.4	3.1
60. Aircraft	1.2	2.2
61. Trains, ships, etc	1.5	3.2
62. Instruments, etc	1.2	2.3
63. Photographic apparatus	1.4	2.6
64. Miscellaneous manufactures	1.6	2.8
65. Transportation	5.2	6.0
66. Telephone	1.0	1.6
67. Radio and TV broadcasting	.6	1.3
68. Utilities	1.9	[1] 125.4
69. Trade	1.7	2.5
70. Finance and insurance	.8	2.0
71. Real estate and rental	1.4	1.8
72. Hotels, personal services	1.7	2.7
73. Business services	1.1	2.2
75. Auto repair	1.9	2.8
76. Amusements, etc	1.0	1.8
77. Institutions	1.1	2.4
78. Federal Government enterprises	2.3	4.6
79. State and local government enterprises	2.1	8.5

[1] Includes 100 percent energy tax.

Rising energy costs inevitably increase the cost of living, adding an additional burden to that of unemployment already imposed on families by the energy shortage. Rise in the cost of living for four different income groups are shown in Figure 6. The impacts are regressive. With the petroleum tax only, the cost of living increases 4 percent for the highest income group (over $20,000) and 6 percent for the lowest income group; with all-energy taxes they range from 7 percent for the highest income group to 12 percent for the lowest.

The average price increase of 8 percent must be added to the current rate of inflation, bringing the annual rate of inflation well into the 10–15 percent range.

FIGURE 6



CONCLUSIONS

Even with a well planned allocation, a 20 percent shortage of petroleum products will severely curtail output and employment in the U.S. economy. Furthermore, we have little peacetime experience with the kind of unemployment caused by input shortages that we now face. Keynesian fiscal and monetary policy, designed to reduce unemployment by stimulating aggregate demand, is entirely inappropriate. But constructive measures can be taken.

(i) If households consume less petroleum products, there will be more for industry. More for industry means more jobs. Major cutbacks in consumption of gasoline and heating oil cannot be based on voluntary sacrifices alone. There is too much danger of ineffectiveness and of unfair distribution. Prompt rationing is not just equitable; it will mean fewer jobs lost.

(ii) Unemployment will be lowest if petroleum is allocated so as to minimize bottlenecks and surpluses. Specific cutbacks of certain energy-intensive final deliveries should be planned. These will automatically reduce the demand for oil by certain major users. Beyond that administrative controls will still be necessary to curtail "wasteful" consumption of fuels.

(iii) Since serious unemployment is likely, the burden must be shared as equitably as possible. Income maintenance programs must be strengthened and alternative employment programs that are low in energy intensity should be designed and held in readiness. These will prevent spiralling unemployment in response to the first direct cuts.

(iv) Rises in the prices of energy and of energy-intensive products are inevitable. They also serve important economic functions. In the short run they will help to direct scarce items to those intermediate users willing and able to pay the most for them. In the long run they will stimulate the development of alternative energy sources and help to reorient our economy toward more reasonable levels of energy consumption. But these price increases are regressive. They impose a disproportionately large burden on lower income families and deny them access to goods that are important to their well-being. In effect, these price increases involve important redistributions of real income. Changes in the tax structure and in transfer payments must be used to offset them. These changes are essential on grounds of equity; they will also help to minimize induced unemployment.

Strong action is needed. The longer we wait, the more petroleum we waste, the more drastic that action will have to be. We cannot afford to wait much longer.

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Herendeen, Robert A. "An Energy Input-Output Matrix for the United States, 1963: User's Guide." University of Illinois at Urbana-Champlain, 1973.

Chairman REUSS. You have delivered a very challenging statement. Now we want to ask you a few questions about it. I am glad to see you come out as strongly as you do for readying a public service employment program. I don't know if you heard the question I asked Mr. Stein about that.

Ms. CARTER. Yes.

Chairman REUSS. Do you agree with me that public service employment, which takes the pressure off of energy and reduces unemployment, is what the doctor ordered?

Ms. CARTER. It is the only way out.

Chairman REUSS. You also make some interesting points about what kinds of industry should be eligible for maximum efforts to increase supply, and what industries are in your judgment secondary. In your prepared statement you list your candidates for reductions. I take it you mean on the overall?

Ms. CARTER. No. These are in final deliveries, not overall reductions.

Chairman REUSS. You start out with the gross private capital formation, and you suggest that 25 percent of the private investment can be postponed in time of national emergency. That is, of course, counter to conventional wisdom, which says, get our plant and equipment, build at even a faster rate, because we are going to have unemployment, and jobs are made both by installing the plant and equipment, and in some fashion not always made clear to me, additional jobs are available with the plant.

Ms. CARTER. But this is a different kind of unemployment. You can't use the plant and equipment if it has no fuel to run it.

Chairman REUSS. Can you quantify at all the basis of the percentage which you assign to a postponement of private capital investment?

Ms. CARTER. No, I can't, really. I should say very frankly that we made this up as something that just seemed plausible in order to demonstrate the kind of program we are talking about. I think that if anyone in a policy-making position is willing to take the approach seriously, we then have to really sit down and figure it out.

I will tell you some of the considerations that went into it. I feel that you can't cut back all the gross private capital formation, because we need a lot of investment in electric power generation and oil drilling and oil refining, if we can get it somehow—in areas that will eventually increase our fuel supply. And those are the most capital intensive investment areas there are. So you can't cut back everything. But my feeling is that gross private capital formation will probably cut itself back to a large extent because of the unemployment. People wouldn't be able to buy very much. When plants aren't selling they are not about to undertake new expansions.

Chairman REUSS. In our tax system, as you know, a 7-percent investment tax credit and a ADR depreciation are given to capital investment of all kinds, necessary or frivolous, whatever. Would you want to change that system and try to concentrate the incentives on those kinds of capital investments that we need, such as energy and the environment, for example?

Ms. CARTER. Yes.

Chairman REUSS. But not give a bonanza for capital investments that are counterproductive?

Ms. CARTER. Exactly. Possibly even discourage them, not only don't give a bonanza, but you may even have to give a disincentive. I don't know whether that would be necessary. But certainly an investment tax credit under this kind of emergency situation doesn't make sense.

Chairman REUSS. The next item that you named for reduction happens to be the very item that Mr. Stein named first, when he was talking about what we ought to expand on because of the coming unemployment; namely, defense expenditure. How do you justify that conclusion?

Ms. CARTER. I justify that in terms of my own set of social priorities. I am sure that there are others at higher levels than myself who feel that defense expenditures should be cut down over the long run, and there is no better time to start than now. I can't give any further complicated argument for it.

Chairman REUSS. I have just been handed a note that the final vote on the trade bill is up. I am going to yield now to Senator Proxmire and ask him to conclude the morning hearing after he has conducted a full examination.

Senator PROXMIRE. I have to leave in about 15 minutes.

Chairman REUSS. I am afraid I shall not be able to get back. So after you and Ms. Carter have had your exchange, will you be kind enough to recess the hearing until 2 o'clock, when we will hear from Mr. Hegeman.

I thank you very much for your testimony. I am sorry that I haven't been able to ask all the questions.

Senator PROXMIRE [presiding]. First of all, I want to congratulate you on a fascinating job. You have done a lot of work and given us a great deal of information that we haven't been able to get from the administration.

Ms. CARTER. It was fun.

Senator PROXMIRE. It is most helpful. Other large computerized models give a different view. We are talking about Wharton, Data Resources, Inc., Chase Econometrics, and so forth. They have yielded results that are far less alarming than the results you have given us this morning. They have been revised to incorporate major oil shortages. They all show an unemployment, for instance, rising to a range of 6 percent next year. I notice that the later Wharton estimate is close to yours, 7.4. But the others are considerably lower. Can you explain the basis for this enormous difference?

Ms. CARTER. I can speculate about it. I don't know the details of their models well enough to say for sure. But I suspect that their models are based on aggregates rather than——

Senator PROXMIRE. Well, DRI has done an industry-by-industry analysis, I understand.

Ms. CARTER. I don't know for sure. I would just have to check it out. I simply can't understand what size of cushion factor they could use.

Senator PROXMIRE. Let me ask you a couple of questions about some of the things that just occur offhand. When industry is faced with any kind of a cutback in production they are usually reluctant to lay people off. In the first place, they eliminate overtime. Then they permit some idle time to accumulate, for many reasons. People are hard to rehire when you furlough them, or especially when you just plain discharge them. Do you take that into account in any way?

Ms. CARTER. Yes; we have them laying off only 0.7 percent for every 1 percent cut.

Senator PROXMIRE. Say that again. You had them laying off what?

Ms. CARTER. We had them laying off only 0.7 percent of employees of labor for every 1 percent cut in total energy.

Senator PROXMIRE. How did you arrive at that figure?

Ms. CARTER. Furthermore before that we put in a cushion factor, in retail trade, we said, you can have a 15-percent cut in total energy without any unemployment. It only starts after the 15 percent.

Senator PROXMIRE. Why couldn't you have a much more drastic reduction in fuel retail trade, with the employees wearing sweaters and vests and so forth?

Mr. CARTER. Well, 15 percent gets it a bit chilly. I would certainly be willing to increase the sizes of the "cushions." I don't have any God-given basis for saying 15 percent is it.

Senator PROXMIRE. How about industry substitutions, where they can substitute coal, for example?

Ms. CARTER. We did put that in. In other words, if an industry used coal and gas and oil, a 10-percent cutback in oil was not a 10-percent cutback in total energy, we pooled all the energy that seemed poolable in terms of what the sector did with it. For example, in petrochemicals we didn't say that they could substitute coal for petroleum, because it was used as feed stocks, and it has to be just exactly what it is in the short run. In the pulp and paper industry we added the oil and the natural gas and the coal together before we arrived at the energy cutback. So that it is really a cutback in total energy, of which the cutback in petroleum products is only a proportion. Then we cushion it, and then we multiply it by 0.7 to arrive at our employment figure.

Senator PROXMIRE. You also had a very large reduction in construction?

Ms. CARTER. Yes.

Senator PROXMIRE. Congressman Reuss mentioned that to some extent. Now, I have been surprised at how stubborn these estimates are, they don't seem to yield at all to energy shortage, they seem to persist in arguing that they are going to continue with this very large expansion in plant and equipment. It is probably the most bullish element in the forecast, it is one of the most stimulating, accelerating, the fact that they expect to do this.

Now, that would make sense to me on the assumption that the embargo does not continue for more than a year or so. I think that is a fairly reasonably assumption, is it not? In other words, they are building a plant not for this coming year, by and large, but they are building a plant for 3, 4, 5, or 10 years ahead.

Ms. CARTER. I didn't forecast the reduction in construction, I recommended it. In particular, I recommended a very large, a 40-percent cut, in State, local, and Federal construction programs. Because construction——

Senator PROXMIRE. That is a recommendation, not a forecast?

Ms. CARTER. That is a recommendation, not a forecast. What I am saying——

Senator PROXMIRE. That recommendation has quite an impact on what I construe as your forecast of unemployment, doesn't it?

Ms. CARTER. It gives us a better forecast of unemployment.

Senator PROXMIRE. If those who make the decision agree with you on your recommendations.

Ms. CARTER. Right. Let me repeat the line of my argument. I am saying that if you are going to lose something out of final deliveries because of the shortage, why don't you choose what you are going to eliminate from final deliveries in such a way as to minimize the impact of the shortage on employment? State, local, and Federal construction has a very high energy content directly and indirectly because it uses a lot of cement and a lot of steel, and a lot of nonferrous metals. These are very energy intensive. If you cut construction in the final deliveries, you eliminate a lot of energy use throughout the economy. I am not predicting that is going to happen. It has to happen as a matter of policy.

Senator PROXMIRE. I think I understand you better. You are saying that if you don't cut that, it is going to be cut somewhere else so that we will have an even deeper unemployment, is that correct?

Ms. CARTER. Exactly. You have got to decide what you are going to cut out of the final deliveries in order to fix the allocation to give you the least possible unemployment.

Senator PROXMIRE. Give me your answer to a prosaic, simple-minded kind of question that occurs to me. I got a call from Wisconsin from people in the tourist industry. They were very disturbed about the present effect they were having on hotels, restaurants, and resorts in our State. They said, "Last year they had a number of reservations, and this year they don't have a single one in northern Wisconsin," there is literally no one going up there. It is a devastating effect. How is this kind of effect, which may be typical for the country as a whole, worked into your model?

Ms. CARTER. In our program of cutbacks, there is a 25-percent cut in automobile and travel services, which includes this kind of resort thing. The assumption that we make—this comes from an assumption that if gasoline is going to be cut back 25 percent, this kind of thing is going to be cut back at least 25 percent. So it is worked in in that way.

Senator PROXMIRE. And you are able to compute the employment effect on resorts, restaurants, and so forth?

Ms. CARTER. Yes.

Senator PROXMIRE. How about with private aviation, snowmobiles, boating, and that kind of thing?

Ms. CARTER. We took out the reduction in air travel. I don't think we specifically took out the boating and whatever. We could do it easily enough. It is simply a matter of changing a number in the final deliveries and then computing back what it does to all industries.

Senator PROXMIRE. Let me ask you a technical economic question you as a professional economist can answer. I am acting as Charlie McCarthy and the staff as Edgar Bergen here. It is true, isn't it, that the model results you have outlined in your prepared statement do not represent an economy in equilibrium, but rather one in a state of severe disequilibrium? You refer to shortages and surpluses of production in your model solutions. Does your model take into any account adjustments through price changes? Do you know of other models that do permit price adjustments that might show how such distortions would be eliminated in a market economy?

Ms. CARTER. First of all, the surpluses and shortages in my model show up only under a situation where you start with an allocation and just let the final deliveries fall where they may. If you take the two-pronged approach of fixing the final demand and then adjusting the allocations of petroleum to just support that, then you are not in disequilibrium, you are in equilibrium, and you don't have the kind of shortages and slacks that you referred to.

Furthermore, I agree that there may be adjustments that the economy makes in terms of prices of, say, substitutions of steel for aluminum or substitutions of cotton for synthetics, or something like that, that the price mechanism can take care of within the economy. I think that in the short run these are rather limited. I think these things take at least a year to work out, and maybe they take longer to work out.

Senator PROXMIRE. Let's see if I understand now what you are saying. Are you saying that there may be, to some extent at least, an assumption on your part of an economy in disequilibrium, while some of the other models that have made more optimistic studies posit in an economy in equilibrium?

Ms. CARTER. No.

Senator PROXMIRE. And for that reason possibly their approach may be more realistic than yours; is that wrong?

Ms. CARTER. No; that is not what I have said. I have worked with two scenarios here.

The first one, which is the proportional allocation idea, the President's cutbacks across the board, is an economy in disequilibrium. The other one, which is two pronged—cut final demand and adjust allocations to fit it—is not in disequilibrium. There are no shortages or at

least I haven't referred to any. The allocation of petroleum just fits the newly cut final demand. So there aren't shortages and slacks there.

Now, let me come back, though, to what you said. It is true that over the long run there may be some price adjustments that would make even the proportional allocation of petroleum work, to make the economy equilibrate in a different way. I don't believe that those price responses are appreciable in the short run. I know of no model that can take them into account in any detail.

Senator PROXMIRE. Let me ask two questions here. No. 1, are you saying that your allocation scheme would limit the large price changes that will take place under the administration's program? No. 2, your projections 1 and 2 take no account of shifts in demand because of price changes or other factors; that is, the auto industry gets more than it needs, given the projected sales drop?

Ms. CARTER. Right.

Senator PROXMIRE. You didn't take that into account?

Ms. CARTER. It doesn't take that into account, because the way the President was advocating the allocation of oil, he gave oil to the automobile industry without projecting what was going to happen to its activity. It was just 15 percent—a percentage cut of what it used to have. That was not taken into account by the suggested guideline.

Senator PROXMIRE. If people are not spending that money on gasoline, they may not decrease their overall buying. They may make it up elsewhere.

Ms. CARTER. They may spend it on something else.

Senator PROXMIRE. They may spend it on something else, and other demand increases, and the effect on unemployment may not be as great as your assumption.

Ms. CARTER. I want to emphasize again that our problem here is not that people aren't spending their money. Our problem here is that with that much of a shortfall in oil, American industry can't produce as much as it used to.

Senator PROXMIRE. Well, would there be a shift into areas that are less energy intensive?

Ms. CARTER. You have got to make that shift, it wouldn't happen by itself.

Senator PROXMIRE. That is one of the things that these very large price changes will do?

Ms. CARTER. I think perhaps it takes a lot longer for price changes to work than perhaps you think it does.

Senator PROXMIRE. What happens in the meantime? Do they save more?

Ms. CARTER. They are unemployed.

Senator PROXMIRE. Yes; but they save more too?

Ms. CARTER. You mean people save more?

Senator PROXMIRE. People save more.

Ms. CARTER. What happens in the short run is that industries can't get their fuel and they shut down, and people have no incomes. That is a perverse kind of saving, I think.

Senator PROXMIRE. Yes; but as we pointed out, there is a big lag in that operation. Employers are reluctant to lay people off. They permit idle time. The productivity drops sharply.

Ms. CARTER. There are layoffs already.

Senator PROXMIRE. There are some, surely. There are spectacular layoffs in the airline industry.

Ms. CARTER. The automobile industry.

Senator PROXMIRE. But with an employment of 85 million, those layoffs are not so impressive overall.

Ms. CARTER. In the plastics industry, and so on.

Senator PROXMIRE. All these studies, which agree with you, indicate that there is going to be increased unemployment.

Ms. CARTER. Right.

Senator PROXMIRE. The only argument is how much.

Ms. CARTER. Yes; what I am saying is that my cushion factors and my 0.7 percent—my cushion factors and my pooling of energy and my 0.7 percent are pretty liberal, I think.

Senator PROXMIRE. The trouble is, that is the only thing.

Ms. CARTER. Yes.

Senator PROXMIRE. Are they pretty liberal, or are they not? Who knows, if you took 70 percent, somebody else may take 50 percent, and depending on what you take, you arrive at a level of unemployment.

Ms. CARTER. I think, Senator Proxmire, that is exactly where it is, so to speak. Nobody knows on the basis of experience, because there is no experience in this area, exactly what generous allowances are.

Senator PROXMIRE. That leaves one area, though, that it seems to me we might be able to agree on. And that is the inequity of this. You pointed out that people with incomes of $8,000 earned less and suffered a 12-percent inflation compared to a 7-percent inflation for those with incomes of $20,000 or more.

Ms. CARTER. Right.

Senator PROXMIRE. Would that be affected by your judgment on the number of unemployed?

Ms. CARTER. No. I think we have that problem whether or not the number of unemployed is cut back in the way I recommend.

Senator PROXMIRE. The only one policy by which we can reduce that inequity is rationing?

Ms. CARTER. Is in rationing and not allowing the prices to double.

Senator PROXMIRE. That is the only way that you cannot allow the prices to double, as I understand it, is to ration.

Ms. CARTER. You can ration and allow the prices to double. That is another possibility. I am suggesting that if you ration and hold the prices down—or you can really have a radically different income supplement.

Senator PROXMIRE. One other question, because this goes the other way. Can your model take account of regional misallocation of fuel or the resulting spatial disruption of trade in intermediate inputs? Doesn't this give you—and all other persons working with national, as opposed to regional models—an optimistic bias in your estimates?

Ms. CARTER. I think it does give an optimistic bias. I live in New England, where we are expecting a 35 percent shortfall.

Senator PROXMIRE. So New England and the Midwest and maybe some other areas would be worse?

Ms. CARTER. Yes, indeed. It could be computed by similar models. But we haven't done it yet.

Senator PROXMIRE. Thank you very much. You have been most helpful. This is fascinating. I will have to study your prepared statement in detail.

Ms. CARTER. Thank you.

Senator PROXMIRE. This afternoon's session at 2 o'clock will not be in this room, it will be in the Rayburn House Office Building, room 2222.

The subcommittee will stand in recess until 2 o'clock.

[Whereupon, at 12:23 p.m., the subcommittee recessed until 2 p.m. the same day.]

AFTERNOON SESSION

Chairman REUSS. Good afternoon. The Subcommittee on International Economics of the Joint Economic Committee will be in session for a continuation of today's hearing on the economic impact of the oil shortage.

We are going to hear this afternoon from Mr. George B. Hegeman, accompanied by Mr. Vince P. Ficcaglia, from Arthur D. Little Co., Inc., of Cambridge, Mass.

Mr. Hegeman, you have a November report plus a statement, which will be received in full in the record. You may now proceed in your own way.

STATEMENT OF GEORGE B. HEGEMAN, SENIOR STAFF MEMBER, ARTHUR D. LITTLE, INC., CAMBRIDGE, MASS., ACCOMPANIED BY VINCE P. FICCAGLIA, STAFF ECONOMIST

Mr. HEGEMAN. I am George B. Hegeman, a senior staff member of Arthur D. Little, Inc. (ADL), of Cambridge, Mass. ADL is an international consulting firm with revenues of $47 million in 1972. Since joining ADL in 1956 I have been responsible for a wide variety of economic and management consulting assignments in the chemical process industry including responsibility over the past year for ADL's consulting work with the Petrochemical Energy Group (PEG), an ad hoc group of petrochemical companies concerned about the impact of the current energy crisis on the industry.

I am accompanied today by Mr. Vince P. Ficcaglia of our staff who is an economist with extensive experience in input/output economics. Since joining ADL in 1967, Mr. Ficcaglia has been responsible for much of the construction and coordination of ADL's long- and short-term econometric models of the U.S. economy. Together we are the authors of the recently published report by Arthur D. Little prepared for the Petrochemical Energy Group designed to assess the impact of a decline in petrochemical production on the Nation's economy. A copy of this report entitled "United States Petrochemical Industry Impact Analysis" is attached to this statement.[1] Summarizing the conclusions of this report, we find that a sustained 15 percent reduction in the output of the organic chemicals industry could result in a loss of 1.6 to 1.8 million jobs in consuming industries and a loss of domestic production value of $65–$70 billion annually.

[1] See report, beginning on p. 62.

WHAT IS THE PETROCHEMICAL INDUSTRY?

Before discussing this report further or responding to the questions posed in Congressman Reuss' letter on December 3, 1973, inviting me to appear before this subcommittee, I believe it is appropriate to provide some background as to exactly what is the petrochemical industry. In brief, this industry is involved in the transformation of petroleum and natural gas hydrocarbons into a wide variety of manmade materials. The production of most of the basic and intermediate chemical products is typically classified in Government statistics within the organic chemicals industry. These chemicals are then sold to other sectors of the petrochemical industry for conversion to such products as synthetic fibers, synthetic rubbers, plastics, detergents and paints. In turn, the fibers, plastics and rubbers are fabricated into end products used in thousands of consumer and industrial products.

The petrochemical industry is surprisingly important to the U.S. economy. If we include within the definition of the petrochemical industry the production of basic and intermediate organic chemicals as well as those plants which produce the synthetic fibers, synthetic rubbers and plastic resins, but exclude all downstream fabricating steps, we have an industry with sales in excess of $20 billion employing some 320,000 people in 1,900 plants throughout the United States. Over the past decade this industry has grown at a rate of about 10 percent per year in real terms and because its prices have been stable, it has contributed significantly to holding down the inflation in our economy.

Since this industry uses petroleum and natural gas hydrocarbons both as a fuel and as the primary raw materials or feedstocks for its plants, the current petroleum shortage will have a double-barrelled effect on its operations. In an attempt to measure the overall effect of a shortage of feedstocks and fuels, PEG asked ADL to undertake an impact analysis on the economy based on a 15-percent reduction in the output of the organic chemicals industry.

In undertaking our impact analysis we made a number of assumptions. These include:

A 15-percent reduction in the output of organic chemicals—this percentage was chosen arbitrarily for analytic purposes and was not a forecast of expected curtailment. This assumption was made in August of this year well before the Arab oil cutoff began.

Shortages will be evenly distributed—for the purpose of our analysis we assumed that a reduction in feedstock and fuel supplies will be distributed evenly throughout the industry affecting the output of all products equally.

Substitution effects were not considered—although some long-run substitution may be possible, the current shortage of all the basic commodities with which petrochemicals derivatives compete, including steel, aluminum, paper, glass and natural fibers, suggests that short-run—1 to 2 years—substitution effects can be discounted.

To evaluate how a sustained reduction in the output of the organic chemicals industry will impact on the U.S. economy, we used the current relationships that exist within the ADL input/output model. This model is based on the input/output table originally developed by the U.S. Office of Business Economics for 1963 which have been revised, expanded, and updated by ADL.

WHAT SPECIFIC INDUSTRIES WILL BE AFFECTED?

While a broad spectrum of the U.S. economy will be affected by a curtailment of petrochemical operations, I believe the most significant impact will be on the following industries: Automotive, packaging, textiles, furniture, construction, pharmaceuticals, and agriculture. Petrochemical products play such a key role in each of these industries that any curtailment of supplies will be translated rapidly and directly into a loss in the output of these industries.

To provide some perspective on this point it is worth noting that the upholstery on the chairs in this room, as well as the fibers in the carpet, the paint on the wall, the draperies, and most of the clothes that we are wearing are in fact petrochemicals products. I also think it is appropriate to say that the petrochemical industry has done an excellent job over the last 25 years in what is called market and product development to move petrochemical products into all aspects of our economy.

You have asked in your letter of invitation, "What is the regional impact on employment?" Our impact analysis of the petrochemical industry focused upon the entire U.S. economy and did not include any regional identification of the results. However, since it is the subcommittee's desire to investigate the regional effects of the present oil embargo, additional analysis has been included for our testimony today.

Table 1, which I believe you all have a copy of, compares the regional distribution of the employment reductions arising from a petrochemical feedstock cutback with the present total employment distribution in the United States. The data indicate that a large share of the employment declines would occur in the Mid-Atlantic, East North Central, and South Atlantic regions of the country. These are crisis regions. It is these areas of the United States which employ the greatest number of workers in the final end-use markets for petrochemicals. While these three regions presently account for 55 percent of the Nation's total employment, they would be hit with 60 percent of the job losses resulting from a 15-percent decline in petrochemical feedstocks.

[The table referred to above follows:]

TABLE 1.—EMPLOYMENT DISTRIBUTION BY CENSUS REGIONS

[In percent]

Region	U.S. employment	Employment losses from 15 percent cutback in petrochemical feedstocks
New England	6.5	6.4
Mid-Atlantic	20.0	19.4
East north-central	20.4	23.0
West north-central	7.6	6.9
South Atlantic	14.9	17.6
East south-central	5.4	5.7
West south-central	8.5	7.3
Mountain	3.8	2.8
Pacific	12.9	10.9
Total	100.0	100.0

WHAT IS THE IMPACT ON GNP?

Mr. HEGEMAN. The estimate of a $65 to $70 billion loss in production contained in our analysis reflects the value of decline in output in not only primary and derivative petrochemical industries and their final end-use markets, but also all industries supplying necessary intermediate raw materials, power, services, and so forth, to these sectors. Because of the inclusion of the value of production loss in intermediate industries, the resultant impact upon U.S. GNP is not directly identifiable. However, since it is this committee's desire to investigate the impact of the oil embargo on the U.S. economy at a macrolevel, we have extended our analysis to derive an estimate of the likely impact such a production loss would have on GNP. Since GNP measures solely the dollar value of all final goods and services produced in the economy, it was necessary to identify that amount attributable to lost production of final products. On balance, we estimate that a 15-percent decline in the supply of organic chemicals could result in a loss of approximately $40 billion of final goods and services.

Prior to the imposition of the oil embargo, many economists in the United States were estimating an increase in GNP during 1974 of approximately $85 to $95 billion. The lack of adequate petrochemical feedstocks would reduce this increase by almost 50 percent.

You have also asked, "What feedstock priorities are there?" [1]

There are three basic feedstocks for the petrochemical industry, including natural gas, natural gas and refinery gas liquids, and petroleum fractions such as naphtha and gas oil.

Natural gas is used to produce such key petrochemical products as ammonia and methanol as well as for fuel purposes throughout the industry. The chemical industry consumes about 10 percent of the U.S. production of natural gas. Of this amount 30 percent is used as a feedstock, the remainder for fuel. The Federal Power Commission in establishing its order of priorities has given feedstock uses a No. 2 priority after residential and commerical customers.

Natural gas and refinery gas liquids include ethane, propane, and butane. These products are used exclusively as feedstocks by the petrochemical industry to produce such basic petrochemicals as ethylene and propylene for plastics and fibers, and butadiene for synthetic rubbers. Virtually 100 percent of the ethane separated from natural gas or refinery gas streams is used by the chemical industry. Propane which is commonly called LPG—liquefied petroleum gas—is a different situation. In 1972 the chemical industry was one of the largest single users of propane consuming about 25 percent of the available supply entirely for feedstocks. However, with curtailments developing in natural gas supplies, many industrial and utility companies have purchased propane supplies for use in their operations during periods of gas curtailment. This has placed great pressure on the propane market leading the administration to establish a mandatory propane allocation program this fall. Although it was intended to assure supplies to historic propane consumers, the petrochemical industry was excluded from the list of priority users in this program.

[1] The opinions expressed here are those of the authors, not Arthur D. Little, Inc., or its clients.

Butane, which is included in the propane allocation program only when mixed with propane, is also a key feedstock that is in short supply. About 9–10 percent of the butane produced by refineries and natural gas liquids separation plants is used by the petrochemical industry. Butane is of particular interest to refiners for injection into the gasoline pool. With the need to increase gasoline supplies, refiners have been reluctant to sell butane to the chemical industry where it is the primary feedstock used in the production of butadiene for synthetic rubbers. No allocation or priority programs currently exist for butane streams that are not mixed with propane.

Petroleum fractions such as naphtha and gas oil are important petrochemical feedstocks both in the production of aromatics such as benzene and olefins such as ethylene and propylene. The petrochemical industry currently consumes approximately 4 percent of domestic petroleum products. The mandatory fuel allocation program proposed by the administration does not provide any priority for petrochemical users of these products. However, the recent Emergency Petroleum Allocation Act of 1973 passed by Congress as S. 1570 and signed by the President should serve as a basis for establishing some priority for the petrochemical industry in the final version of the mandatory fuel allocation program.

SPECIFIC IMPACT OF PETROLEUM SHORTAGES ON THE PETROCHEMICAL INDUSTRY [1]

The current petroleum shortage has placed the petrochemical industry in a position whereby all three of its basic feedstocks are in short supply. I do not have sufficient information at this time to make a forecast of the extent to which petrochemical operations will be curtailed by the current petroleum shortage. However, it is not unrealistic to anticipate that the combined effect of shortages in all three types of feedstocks will lead to a reduction in industry output.

It appears now that the current shortage is so severe that refinery output will be rearranged in favor of fuel oil over gasoline. This change could have an impact on the petrochemical industry since it may reduce the level of catalytic cracking operations. This in turn may curtail the availability of refinery propylene, about 20 percent of which is typically sold to the chemical industry. Thus, care should be taken that the rush to make major shifts in refinery output does not unintentionally cut out raw material supplies to the petrochemical industry.

In the short term the petrochemical industry can make significant savings in the amount of energy used per unit of output. Currently, I believe the industry can, through conservation efforts and careful energy management programs, reduce energy use by perhaps 8 to 10 percent per unit of production which will provide some relief from energy shortages.

While many industries including the petrochemical industry will have to look to other forms of energy to meet their long-term energy requirements, the petrochemical industry has a unique requirement for hydrocarbons in feedstocks and certain process fuel aplications which

[1] The opinions expressed here are those of the authors, not Arthur D. Little, Inc., or its clients.

I believe should be recognized. In fact, as we move to reallocate our energy supply and restructure our energy demand, perhaps we should consider whether or not the form value of petrochemical products is not a higher order of priority than the use of hydrocarbons solely for fuel.

Thank you.

Chairman REUSS. Thank you, Mr. Hegeman.

[The report attached to Mr. Hegeman's statement follows:]

UNITED STATES PETROCHEMICAL INDUSTRY IMPACT ANALYSIS

A Report to

The Petrochemical Energy Group

November 1973

U.S. PETROCHEMICAL INDUSTRY IMPACT ANALYSIS

I. SUMMARY

The current shortages of oil and gas in the United States have forced the Federal Government to implement a Mandatory Fuel Allocation Program, a Mandatory Allocation Program for Propane, and to supervise an expanding level of curtailments in natural gas supplies to interstate pipelines. These shortages will have a significant impact on the whole economy and the petrochemical industry as a major consumer of oil and gas hydrocarbons will be directly affected. However, the impact on this industry and its customers will be significantly greater than on other industries because these hydrocarbons are used not only as fuel but also as the primary raw materials or feedstocks for this business.

As a result of the current shortages, it is not unrealistic to expect that petrochemical production will decline in the near future. To assess the impact of a decline in petrochemical production on the nation's economy as a whole, the Petrochemical Energy Group (PEG) asked Arthur D. Little, Inc. (ADL) to develop an estimate of the effect of a 15% decline in the organic chemicals industry on consuming industries. Through the use of input-output economic analysis, ADL estimates that a sustained 15% reduction in the output of the organic chemicals industry could result in a loss of 1.6 to 1.8 million jobs in consuming industries and a loss of domestic production value of $65-70 billion annually.

While our analysis assumes a decline in production of 15%, it is difficult at this time to anticipate just how extensive a decline will actually result from the current allocation and curtailment programs. Should these programs not provide for the feedstock and process fuel needs of the petrochemical industry, its output will be reduced with the effects cascading throughout the economy.

II. INDUSTRY IMPACT ANALYSIS

To evaluate how a sustained 15% reduction in the output of the U.S. organic chemicals industry will impact on the U.S. economy requires an analytical framework that is a balanced, internally consistent model of the U.S. economy which identifies this sector of the chemical industry and defines its relationship to primary, secondary, and final demand markets. Input/Output economic models have this capability and Arthur D. Little, Inc., uses this type of model in its economic forecasting and regional impact analysis work. The effects developed in this report reflect the current relationships that exist within the ADL Input/Output model based on the Input/Output table originally developed by the U.S. Office of Business Economics for 1963 which has been revised, expanded, and updated by ADL.

A. Background on Input/Output Models

Input/Output analysis focuses on the interaction of all industries in producing our gross national product. Each row of an Input/Output table identifies the interindustry sales structure of the economy by depicting the sales of a particular industry to each of its industrial customers, as well as to final markets.

Although Input/Output analysis has a variety of applications, its major contribution is that it permits measurement of the industrial repercussions of changes in demand levels or production activities. For example, the Input/Output technique allows one to estimate the total impact upon various sectors of the economy of an increase in the demand for passenger cars. This increase in demand will lead to an increase in the output of the automobile industry. However, there will be further impacts. The automobile industry will demand more upholstery fabrics and the increased production of these fabrics will require more synthetic fibers and more plastics. The use of Input/Output techniques allows one to quantify the magnitudes of the increased production in all affected industries.

In like fashion, the Input/Output methodology can be used to identify the impact of a reduction in the output levels of particular raw material suppliers on the level of production in related final end-use markets. By transforming the Input/Output matrix, one can obtain production multipliers which indicate how a change in demand in a final user market will impact upon all industries in the economy. By identifying the ultimate end-use markets for a particular raw material, one can utilize these production multipliers to estimate the resultant impact upon the economy from a cutback in the production in a given sector.

B. Impact of the Petrochemical Industry

The U.S. petrochemical industry takes certain petroleum fractions, natural gas, and natural gas liquids, and transforms them into a wide variety of man-made materials. The production of the basic chemicals and many intermediate products is typically classified in government statistics within the Standard Industrial Classification for Organic Chemicals (SIC 2818). These intermediates are then sold to other sectors of the Chemicals and Allied Products industry for conversion to such products as synthetic fibers, plastics, synthetic rubber, detergents, and paints. In turn, the fibers, plastics and rubbers are fabricated into end products used in thousands of consumer products.

Although other hydrocarbon source raw materials have been used by the Organic Chemicals industry, this industry today is more than 95% dependent on hydrocarbons from petroleum and natural gas. Thus, a reduction in the amount of feedstocks available to the industry will be translated directly to a loss in physical output of the industry.

For the purposes of this analysis we have assumed that a reduction in feedstocks and fuel supplies will be distributed evenly throughout the industry affecting the output of all products equally.

If petrochemical output is reduced by no more than about 5%, imports of primary and intermediate organic chemicals might mitigate the effects of a decline in the output of primary petrochemicals. However, this would reduce or eliminate the favorable $1.3 billion annual balance of

trade in petrochemicals. If industry output were reduced by more than 5%, the current worldwide shortage of primary petrochemicals and intermediates would limit the ability of consuming industries to secure supplies abroad. The use of substitute materials might also mitigate the effects on lost production and employment. However, given the current tightness of supplies for most basic commodities, it is unlikely that adequate quantities of substitute materials will be available.

Every effort has been made in this analysis to eliminate double-counting which could result from two industry sectors supplying the same final market. For example, plastics, fabrics, and tires supplied to the automotive industry are all derived from petrochemicals and the full impact could be attributed to any one of these primary market sectors. In this case the impact was determined in the plastics sector and not included in the synthetic fiber and synthetic rubber calculation.

The results of our basic impact analysis are summarized in Table 1. A review of the results of our basic impact analysis (Tables 2 - 6) indicated that there were several special factors that must be taken into account in reaching a conclusion regarding the magnitude of the impact of a 15% decline in the production of organic chemicals. These factors include:

- Inflation - In our basic analysis, the data on value shipments and employment has been taken from the 1970 Annual Survey of Manufactures. Our analysis did not include an upward adjustment in the value of lost production to account for price movements in each of the industries included for the 1971-1973 period. Based upon an annual average rate of increase in the GNP-deflator of 4.3% during this period, the value of lost production would need to be increased more than $8.7 billion to reflect current (1973) price conditions.

- Incomplete coverage - Our basic analysis concentrated upon estimating the impact upon major end-use markets. This procedure omits, therefore, consideration of the impact on several relatively smaller markets such as the paper and

TABLE 1

SUMMARY

IMPACT OF A 15% DECLINE IN PRODUCTION OF ORGANIC CHEMICALS

Item	Loss in Production Value ($ MM)	Loss in Employment (000)
A. Basic Analysis		
1. Organic Chemicals	1,100	15
2. Primary Markets for Organic Chemicals	3,910	71
3. Final Market for Organic Chemicals	67,270	1,804
B. Special Factors		
4. Inflation (1970-73)	+8,750	--
5. Incomplete Coverage (plastics, fibers, rubbers)	+7,030	+175
6. Non-Linearity Effects	-13,200	-330
7. Net Effect	+2,580	-155
Adjusted Total	69,850*	1,735**
C. Probable Range of Impact	$65-70 billion	1.6 - 1.8 million

* Sum of 3 and 7
** Sum of 1, 2, 3 and 7

Sources: 1970 Annual Survey of Manufactures
1963 Input-Output Table
ADL Input-Output Model

non-ferrous wire coating industries for plastics, the rug industry for synthetic fibers, and non-automotive rubber products for synthetic rubber. A more detailed review of these other markets indicates the impact of lost production would increase by another $7.0 billion and an additional 175,000 jobs would be lost.

- Non-Linear Effects - The Input/Output methodology employed in our analysis implicitly assumes linear relationships between inputs of particular commodities and production in consuming industries. For most industries in the U.S. economy, such an assumption is acceptable since many production functions are approximately linear with respect to material inputs. However, in the case of crop production, this linearity assumption is not valid regarding crop yield in response to fertilizer and pesticide inputs.

  At current levels of usage in the U.S., a reduction in the level of application of nitrogen fertilizers would not result in a directly proportional reduction in crop yield. A similar situation would also apply to the reduction in the use of insecticides and herbicides. We estimate that a reduction of 15% in the use of nitrogen fertilizers and pesticides would probably result in a reduction of agricultural output of approximately 5%. This relationship is generally supported by statistical data on increases in yield, and in total agricultural output of the major crops, and usage of nitrogen fertilizer.

  To adjust for this non-linear relationship, we have reduced our estimate of the impact upon production in the food processing industry by two-thirds. This adjustment has the effect of reducing the lost production value in our basic analysis by more than $13.0 billion.

On balance, these special factors add $2.5 billion of additional lost production to our basic impact analysis or less than a 5% upward adjustment. As a result, we conclude the probable range of the total

economic impact of a sustained 15% reduction in the production of organic chemicals will be an annual loss in production of $65-70 billion and a loss of 1.6 - 1.8 million jobs.

TABLE 2

IMPACT ANALYSIS - SUMMARY
15% DECLINE IN PRODUCTION OF ORGANIC CHEMICALS

Market	Annual Loss in Production Value ($ MM)			Loss in Employment (000)
	Primary Market	Secondary Market	Final Market	
Plastics	645			11
Fabricated Plastics		1050		43
Final Markets			28,250	700
Synthetic Fibers	425			10
Fabrics and Yarns		2675		70
Final Markets			4,390	110
Synthetic Rubber	150			2
Tires		690		15
Final Markets			580	15
Agricultural Chemicals	130			2
Final Markets		--	19,775	495
Medicinals and Pharmaceuticals	980			18
Final Markets		--	1,130	28
Soaps and Detergents	450			5
Final Markets		--	515	13
Paint	510			11
Final Markets		--	6,000	150
Toilet Preparations	520			8
Final Markets			600	15
Cellulosic Fibers	100			4
Final Markets			6,030	150
Subtotal	3,910		67,270	1,875
Organic Chemicals	1,106			15
Total Final Market Impact			67,270	1,890

Sources: 1970 Annual Survey of Manufactures
1963 Input-Output Table
ADL Input-Output Model

Note: Every effort has been made to avoid double-counting by including the impact upon a particular final market only once in our estimates, although a final market may purchase materials from more than one sector. For example, plastics, fibers, and rubbers all are used in automobiles, but the impact on the auto industry has been included only once under the plastics sector.

TABLE 3

IMPACT ANALYSIS

15% DECLINE IN PRODUCTION OF ORGANIC CHEMICALS

		$ MM
1.	1970 Value of Shipments - Organic Chemicals (SIC 2818)	7373
2.	15% Reduction in (1)	1106

3. Distribution of Organic Chemical Sales

	Market	% of Organic Chemical Sales	Decline in Consumption of Organic Chemicals ($ MM)
a.	Plastics	30	332
b.	Organic Fibers	14	155
c.	Agricultural Chemicals & Food Processing	8	88
d.	Medicinals & Pharmaceuticals	4	44
e.	Soaps & Detergents	4	44
f.	Synthetic Rubber & Tires	6	66
g.	Paint	3	33
h.	Toilet Preparations	2	22
i.	Cellulose Fibers	2	22
	Total	73	806

4. Impact of Above Declines in Organic Chemical Production on:

		Factor	Annual Loss in Production ($ MM)	Loss in Employment (000)
a.	Plastic Resins - Final Markets (See Table 4)		28,250	700
b.	Synthetic Fibers - Final Markets (See Table 5)		4,390	110
c.	Agricultural Chemicals & Food Processing			
	1. 1970 Value of Shipments - Ag. Chem. (SIC 2879)		858	
	2. 15% Reduction in (1)		128	2
	3. 15% Reduction in Food Processing (SIC 20)		14,647	
	4. Output Multiplier for Food Processing	1.35		
	5. Decline in Shipments in All Other Sectors		19,773	495

TABLE 3 (continued)

	Factor	Annual Loss in Production ($ MM)	Loss in Employment (000)
d. Medicinals & Pharmaceuticals			
1. 1970 Value of Shipments - Med. & Pharm. (SIC 2833, 2834)		6,556	
2. 15% Reduction in (1)		983	18
3. Output Multiplier for Med. & Pharm.	1.15		
4. Decline in Shipments in All Other Sectors		1,130	28
e. Soaps & Detergents			
1. 1970 Value of Shipments - Soaps & Detergents (SIC 2841)		2,989	
2. 15% Reduction in (1)		448	5
3. Output Multiplier for Soaps & Detergents	1.15		
4. Decline in Shipments in All Other Sectors		515	13
f. Synthetic Rubber & Tires (See Table 6)		583	15
g. Paint			
1. 1970 Value of Shipments - Paint (SIC 2851)		3,408	
2. 15% Reduction in (1)		511	11
3. 15% Reduction in Maintenance		7,500	
4. Output Multiplier for Maintenance	0.8		
5. Decline in Shipments in All Other Sectors		6,000	150
h. Toilet Preparations			
1. 1970 Value of Shipments - Toilet Preparations (SIC 2844)		3,461	
2. 15% Reduction in (1)		519	8
3. Output Multiplier for Toilet Preparations	1.15		
4. Decline in Shipments in All Other Sectors		597	15

TABLE 3 (continued)

	Factor	Annual Loss in Production ($ MM)	Loss in Employment (000)
1. Cellulose Fibers			
1. 1970 Value of Shipments - Cellulose Fibers (SIC 2823)		685	
2. 15% Reduction in (1)		103	4
3. 15% Reduction in Rugs, Tire Cord, etc.		3,350	
4. Output Multiplier for Rugs, Tire Cord, etc.	1.8		
5. Decline in Shipments in All Other Sectors		6,030	150

TOTAL IMPACT	Annual Loss in Production Value ($ MM)	Loss in Employment (000)
Organic Chemicals	1,106	15
Primary Markets	3,910	71
Secondary Markets in Fibers, Rubbers and Plastics	4,415	128
Final Markets for Organic Chemicals	67,270	1,676
		1,890

Sources: 1970 Annual Survey of Manufactures
1962 Input-Output Table,
ADL Input-Output Model

Note: Every effort has been made to avoid double-counting by including the impact upon a particular final market only once in our estimates.

TABLE 4

IMPACT ANALYSIS
15% DECLINE IN PRODUCTION OF PLASTIC RESINS

		Factor	$ MM
1.	1970 Value of Shipments - Plastic Resins (SIC 2821)		4286
2.	15% Reduction in (1)		643
3.	% of Plastic Resin Shipments to Non-Integrated Plastic Fabrication (SIC 3079)	41%	
4.	Reduction in Plastic Resin Sales to Plastic Fabrication: (2) x (3)		264
5.	1970 Value of Shipments - Plastic Fabrication		6993
6.	Value of Plastic Resin Consumed by Plastic Fabrication: (3) x (1)		1757
7.	Less Reduction in Plastic Resin Availability: (4)		264
8.	Net Shipment of Plastic Resin to Plastic Fabrication: (6) - (7)		1494
9.	∴ Value of Shipments - Plastic Fabrication: (5) x (8) - (6)		5944
10.	Net Decline in Shipments of Plastic Fabrication: (5) - (9)		1049
11.	Major End-Use Markets for Plastic Fabrication:		

% of Shipments	Factor	Shipments ($ MM)	Annual Loss in Production Value ($ MM)
2.5% - Upholstery			
1. 1970 Value of Shipments		5080	
2. 15% Reduction in (12)		762	
3. Output Multiplier	1.5		
4. Decline in Shipments in All Other Sectors			1143
8.4% - Furniture			
1. 1970 Value of Shipments		8967	
2. 15% Reduction in (14)		1345	
3. Output Multiplier	1.6		
4. Decline in Shipments in All Other Sectors			2152

TABLE 4 (continued)

% of Shipments	Factor	Shipments ($ MM)	Annual Loss in Production Value ($ MM)
8.4% - Motor Vehicles			
1. 1970 Value of Shipments		45692	
2. 15% Reduction in (16)		6854	
3. Output Multiplier	1.4		
4. Decline in Shipments in All Other Sectors			9595
7.4% - Construction			
1. 1970 Value of Production		77255	
2. 15% Reduction in (18)		11588	
3. Output Multiplier	0.8		
4. Decline in Shipments in All Other Sectors			9270
8.3% - Packaging			
1. 1970 Value of Shipments		41600	
2. 15% Reduction in (20)		6237	
3. Output Multiplier	1.0		
4. Decline in Shipments in All Other Sectors			6237
7.2% - Miscellaneous Manufacturing			
1. 1970 Value of Shipments		9767	
2. 15% Reduction in (22)		1465	
3. Output Multiplier	0.9		
4. Decline in Shipments in All Other Sectors			1319

TOTAL IMPACT	Annual Loss in Production ($ MM)	Loss in Employment (000)
Plastic Resins	643	11
Fabricated Plastics	1049	43
All Other Industries	28251	700
		754

Sources: 1970 Annual Survey of Manufactures
1963 Input-Output Table
ADL Input-Output Model

Note: Every effort has been made to avoid double-counting by including the impact upon a particular final market only once in our estimates.

TABLE 5

IMPACT ANALYSIS
15% DECLINE IN PRODUCTION OF SYNTHETIC FIBERS

		Factor	$ MM
1.	1970 Value of Shipments - Synthetic Fibers (SIC 2824)		2822
2.	15% Reduction in (1)		423
3.	% of Synthetic Fibers Shipments Made to Fabrics/Yarn Industry (SIC 221, 222, 223, 224, 226, 228)	60%	
4.	Reduction in Synthetic Fiber Sales to Fabrics/Yarn Industry: (2) x (3)		254
5.	1970 Value of Shipments - Fabrics/Yarn		17699
6.	Value of Synthetic Fibers Consumed by Fabrics/Yarn Industry: (3) x (1)		1681
7.	Less Reduction in Synthetic Fiber Availability: (4)		254
8.	Net Shipment of Synthetic Fiber to Fabrics/Yarn: (6) - (7)		1427
9.	∴ Value of Shipments - Fabrics/Yarn: (5) x (8) ÷ (6)		15025
10.	Net Decline in Shipments - Fabrics/Yarn: (5) - (9)		2674
11.	Output Multiplier for Fabrics/Yarn (Net)	1.8	
12.	Decline in Shipments in All Other Sectors: (10) x (11)		4815
13.	Net Decline in Shipments in All Other Sectors: (12) - (2)		4392

TOTAL IMPACT	Annual Loss in Production ($ MM)	Loss in Employment (000)
Synthetic Fibers	423	10
Fabrics/Yarn	2674	70
All Other Industries	4392	110
		190

Sources: 1970 Annual Survey of Manufactures
1963 Input-Output Table
ADL Input-Output Model

Note: Every effort has been made to avoid double-counting by including the impact upon a particular final market only once in our estimates. For example, synthetic fiber sales to upholstery or tire manufacturers have been excluded because the impact for these industries has been calculated elsewhere in this analysis.

TABLE 6

IMPACT ANALYSIS
15% DECLINE IN PRODUCTION OF SYNTHETIC RUBBER

		Factor	$ MM
1.	1970 Value of Shipments - Synthetic Rubber (SIC 2822)		992
2.	15% Decline in (1)		149
3.	% of Synthetic Rubber Shipments Made to Tire Industry	45%	
4.	Reduction in Synthetic Rubber Sales to Tire Industry: (2) x (3)		67
5.	1970 Value of Shipments - Tires (SIC 3011)		4587
6.	Value of Synthetic Rubber Consumed by Tire Industry: (3) x (1)		445
7.	Less Reduction in Synthetic Rubber Availability: (4)		67
8.	Net Shipments of Synthetic Rubber to Tire Industry: (6) - (7)		378
9.	∴ Value of Shipments of Tire Industry: (5) x (8) ÷ (6)		3896
10.	Net Decline in Shipments of Tires: (5) - (9)		690
11.	Output Multiplier for Tires (Net)	1.06	
12.	Decline in Shipments in All Other Sectors: (10) x (11)		731
13.	Net Decline in Shipments in All Other Sectors: (12) - (2)		583

TOTAL IMPACT	Annual Loss in Production ($ MM)	Loss in Employment (000)
Synthetic Rubber	149	2
Tire Shipments	690	15
All Other Industries	583	15
		32

Sources: 1970 Annual Survey of Manufactures
1963 Input-Output Table
ADL Input-Output Model

Note: Every effort has been made to avoid double-counting by including the impact upon a particular final market only once in our estimates. For example, tire sales to the auto industry are excluded because the impact for the auto industry has been calculated elsewhere in this analysis.

Chairman REUSS. Your assumed figure for the decline in production of organic chemicals is, I believe, 15 percent?

Mr. HEGEMAN. That is correct.

Chairman REUSS. You also estimate potential savings of up to 8 to 10 percent per unit of production as a result of conservation efforts.

Mr. HEGEMAN. That is in energy uses, not in feedstock uses. I want to distinguish between those two requirements of the chemical industry.

Chairman REUSS. Are you able to be any more definite and certain about the possible decline in organic chemical production? You really don't have an estimate at all, you simply plucked the 15 percent out of the air as an assumption?

Mr. HEGEMAN. That is correct.

Chairman REUSS. Are you able to make any kind of a guess?

Mr. HEGEMAN. Under the current conditions of very rapidly changing regulations affecting both feedstocks and fuels—particularly the propane program and the mandatory fuel program, both of which are being revised with new regulations to be issued within a week or so—I think it is very difficult to make an intelligent forecast at this time.

Perhaps when those programs become more definite it may be possible to develop a forecast.

Chairman REUSS. Among the various users of feedstocks, such as agricultural, construction, textiles, furniture, and pharmaceuticals, do you have any suggestions as to their relative importance and what guidance you would give to the allocating authority as between these various uses of feedstocks?

Mr. HEGEMAN. Between the uses of petrochemical products downstream?

Chairman REUSS. Yes.

Mr. HEGEMAN. I have no suggestions to make at this time on allocation programs. That would be allocating products outside of the petrochemical industry and I am not in a position to make suggestions at this time. Those products are not now under allocation, nor is it contemplated to my knowledge.

Chairman REUSS. What about the rationing of feedstocks, both petrochemicals as opposed to other uses, and within petrochemicals?

Mr. HEGEMAN. I think that the petrochemical industry, because of its impact on the economy, should be given consideration with regard to the various allocation programs that are being developed, and a priority assigned to petrochemicals commensurate with its importance relative to other demands on the fuel system.

Chairman REUSS. Do you have any judgments as to its importance relative to other fuel demands?

Mr. HEGEMAN. I certainly believe that consumer requirements for gasoline for pleasure driving and similar uses could be curtailed—as in fact they already are—in favor of petrochemical feedstocks.

Chairman REUSS. Can you tell us anything about the present investment intentions of the petrochemical industry?

Mr. HEGEMAN. Yes. The investment in the petrochemical industry reached a peak in 1966, according to the figures available from the Department of Commerce, through their annual survey. It peaked in terms of purchasing power, and after the actual dollars have been deflated by a construction cost index it indicates investment declined

approximately 20 perecnt through 1971. What happened was the industry overbuilt its capacity because the size of plants was shifting significantly, so that much larger scale plants had to be built to be economic. As a result, the industry had surplus capacity in the late 1960's. And, of course, with the economic slowdown in 1970 and 1971, this surplus capacity remained. That was until 1972. Then this year they showed intentions of a rapid increase in new investment. The shortages in the industry did not begin to appear until the early part of this year, at which time the industry began to consider further investment for expansion, and increased its capital spending plans.

Chairman REUSS. In your regional breakdown of the unemployment effects of petrochemical reductions, the mid-Atlantic region, the East-North Central region and the South Atlantic region, as you pointed out, had a much larger share of the declines in employment than occurred elsewhere.

Is that because of the concentration of these five regions on textiles and furniture?

Mr. HEGMAN. I will ask Mr. Ficcaglia to respond to that.

Mr. FICCAGLIA. Principally it is because of the high concentration of both of the petrochemical industries in this area, such as the plastics industry and the paint industry, but also high concentration of many of the final end use markets that you referred to—the furniture industry and the upholstery industry, concentrating in these three regions of the Nation.

Chairman REUSS. This morning the administration indicated that unemployment next year over today would not exceed—I think the figure was about a million people. Your estimate, if I understand you correctly, suggests that unemployment in petrochemicals alone would exceed this figure. Am I correct in my reading?

Mr. HEGEMAN. That is correct. The question remains, however, whether other sectors of the economy could pick up as a result of a decline in the spending by consumers on petrochemical products. If they can, then that would mitigate the unemployment effect associated with the downstream petrochemical industry. If they cannot, then these estimates would stand.

Chairman REUSS. Isn't that a rather optimistic assumption that all the rest of the economy would be able to sufficiently increase employment so as to balance out the loss of the petrochemical segment?

Mr. HEGEMAN. In the current environment I think that that would be correct, sir.

Chairman REUSS. Thank you very much, Mr. Hegeman and Mr. Ficcaglia, for your excellent report and your responsiveness to our quesetions. We are very grateful.

The subcommittee will now stand in recess until 10 o'clock tomorrow morning in room S–407 of the Capitol.

[Whereupon, at 2:25 p.m., the subcommittee recessed, to reconvene at 10 a.m., Wednesday, December 12, 1973.]

ECONOMIC IMPACT OF PETROLEUM SHORTAGES

WEDNESDAY, DECEMBER 12, 1973

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON INTERNATIONAL ECONOMICS
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room S-407, the Capitol Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representative Reuss; and Senators Proxmire and Javits.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Michael J. Runde, administrative assistant; William A. Cox, Sarah Jackson, John R. Karlik, and L. Douglas Lee, professional staff members; Leslie J. Bander, minority economist; George D. Krumbhaar, Jr., minority counsel; and Walter B. Laessig, minority counsel.

OPENING STATEMENT OF CHAIRMAN REUSS

Chairman REUSS. Good morning. The Subcommittee on International Economics will be in order for a continuation of its hearings on the economic impact of the petroleum shortage.

Yesterday we heard a wide range of estimates of how serious the impact on the U.S. economy would be as a result of fuel shortages. The administration witnesses considered the situation quite manageable. They suggested that shortages may not be as great as the President predicted 2 weeks ago, unemployment would not be expected to exceed 6 percent, and higher prices would provide an adequate and efficient means of allocating available supplies.

But other witnesses challenged the optimism of this view, suggesting much higher rates of unemployment, bottlenecks causing further shortages, and a severe impact on real income distribution. Such forecasts led the witnesses to recommend immediate rationing, public service employment, and a much greater degree of planning in the allocation of available oil supplies to minimize economic dislocations.

This morning we continue our investigation into the impact of shortages on the domestic economy. We will examine more closely the specific policies available to increase immediate energy savings and to provide adequate allocation of available fuels to critical sectors and services in the economy.

For example, will rationing by higher prices and taxes, discussed yesterday by the administration, effectively cut gasoline consumption? What measures are available to limit consumer use of natural gas and electricity? What consequences will these measures have on standards of living, including those of the poor? If we must choose among

industries to protect as many jobs as possible and to keep shortages from snowballing into a major recession, what criteria should be used for fuel allocations?

This morning we will hear from Joseph C. Swidler, Chairman of the New York Public Service Commission, who will discuss the impact and remedies as they relate to consumer interests.

And then Mr. Walter W. Heller of the economics department of the University of Minnesota, who will continue the analysis of the broad impact of the shortages.

And finally, Mr. John R. Meyer, 1907 Professor of Transportation, Logistics and Distribution at Harvard and President of the National Bureau of Economic Research, who will testify on aspects of the transport sector.

Since Mr. Swidler may have to leave us before the end of the hearings, I am going to call on him first. Each one of you has produced a most helpful prepared statement. And under the rules and without objection they will be received in full into the record.

And we would now like to ask you, Mr. Swidler, to proceed in any way you care to, either by reading it or going beyond it.

STATEMENT OF HON. JOSEPH C. SWIDLER, CHAIRMAN, NEW YORK STATE PUBLIC SERVICE COMMISSION

Mr. SWIDLER. Thank you, Chairman Reuss. I appear today at your invitation to discuss the petroleum shortages confronting this country and the possible measures to alleviate the situation. First, I should like to discuss the extent of the shortages.

As you know, the administration estimates as to the extent of shortages have been climbing gradually. A couple of months ago the shortfall was placed at about 6 percent, or a little over 1 million barrels a day. More recently the President has used an estimate of 17 percent, equivalent to about 3 million barrels a day. As of the weekend the latest newspaper reports were that the shortfall may be as much as 4 or 4½ million barrels a day. Without claiming any special expertise in fixing the numbers I can readily accept an average figure of 3½ to 4 million barels a day, in a total of about 18 to 19 million barrels, or approximately 20 percent, and I think probably 17 percent would be a more conservative number.

Such a large shortfall implies a drastic limitation on our economy. Of course, the other way to look at it is that we have 80 percent of our oil resources still available, and since oil accounts for less than half of total energy use, about 90 percent of energy availability. A shrinkage of 10 percent in total energy, if managed intelligently so that the savings come out of waste or uses of low priority, should not be too damaging to our economy. The country has the ability to take this blow in stride if we organize ourselves to make the best of the situation. If we succeed in such a savings program we would be all the stronger for this demonstration of resilience, discipline and administrative competence.

A global figure, whether it be 7 percent, 17 percent, or 20 percent, does not tell the whole story. There are several important considerations to be kept in mind aside from the overall percentage or number

of barrels of shortfall, and these considerations are crucial in determining the economic impact of the shortages.

In the first place, I believe the larger percentages which have been mentioned reflect some blows which have not yet fallen. Cargoes are still coming in from foreign refineries which are running old stock, and the Arab net has yet to be tightened to the maximum. We must prepare for a worse import situation than has yet occurred.

Second, the shortage is not spread evenly either by product or by area. Some parts of the country may have enough or nearly enough of some or all products, while in other areas some or all petroleum products may be in extreme shortage.

The most conspicuous example of potential vulnerability is the powerplant fuel situation on the east coast. This country now imports on average about 1.8 million barrels a day of residual oil, which is the form in which oil is commonly burned in powerplants. This amount happens also to be the amount of the residual oil burned on the east coast. About 1.7 million barrels a day of residual oil are burned on the east coast, or about 95 percent of east coast residual oil consumption is derived from imports. As nearly as I can determine, roughly half the total comes from sources subject to embargo. Some individual companies are in an even more precarious situation. Shortages of this potential magnitude cannot be met by conservation measures alone. With such a potential for disaster, it is apparent that the Federal Government should be preparing itself now for the most severe test of its allocation authority and logistical capabilities.

It is also necessary to consider the role of storage in equalizing use and availability. Normally, storage of heating oils is built up in the summer and fall, and drawn down through the winter, while storage of gasoline is built up in the winter and spring and drawn down in the summer. What this seasonal pattern means is that we must allocate or ration on a seasonal basis rather than from day to day, or we risk shortages of fuel oil at winter's end of far greater proportions than any of the figures which have been mentioned.

I have referred to the fact that oil accounts for less than half of total fuel use. Natural gas is the next largest fuel source, accounting for some 32 percent of the national total, but natural gas is also in short supply. Since oil and gas are interchangeable to a very large degree, they form a common energy pool.

A great many large consumers throughout the country are in position to burn either oil or gas. Any savings in gas use would therefore be translated immediately into relief of pressure on oil supplies. No program has yet been proposed for mandatory gas conservation—although I heard Mr. Simon refer to this matter on Monday—except that the FPC has ordered the curtailment of so-called low-priority users, which include many important industries providing employment to American workmen. It seems to me that in the crisis that now confronts us, a key part of a conservation program is somehow to impose on residential gas users the same kind of inducements and persuasion to reduce consumption which is now being applied to users of home heating oil.

To suggest the dimensions of the potential relief which a gas conservation program might make available, consider that house heating probably accounts for some 5 or 6 trillion cubic feet of gas a year out

of the total of 22 trillion. A 15-percent saving would amount to almost 1 trillion cubic feet, which is the equivalent of 200 million barrels over the winter period, or about 1 million barrels a day of the 3 or 4 million barrels a day of shortfall.

You have probably heard it said many times that this country is very rich in coal reserves, enough for many decades in the future. This is true and it is important. In this period of crisis it is reassuring that we have such riches in the ground, although we make little use of it. Unfortunately, most of the coals available in the East are high in sulfur, and we do not know how to burn the coal without releasing into the atmosphere more sulfur than present environmental regulations permit.

Because of environmental problems the rate of production of coal has been stagnant for many years and hovers around the 550-million-ton level. As a portion of the total fuel supply coal declines year by year. In 1973 coal amounted to about 17 percent of national primary energy supply, down from about 20 percent a few years ago.

Many of the powerplants on the east coast have converted from coal to oil in order to comply with environmental restrictions, thereby aggravating the problem of oil supply and risking dependence on imports. Some of these plants can be shifted back to coal, but coal supplies are tight, there is little excess mining capacity, and it would be unrealistic to look to coal for substantial relief of fuel shortages in the near term. Several years are required to open new underground mines. A number of power companies are in the process of reconverting to coal, but I doubt that all of them will be able to obtain adequate coal sources, even if sulfur restrictions are waived to permit the burning of coal.

Both State and Federal environmental agencies seem inclined to permit the buring of coal containing sulfur in excess of the normally permitted limits, if at all, for ony a few months at a time. The fuel situation is not likely to be improved next year or the year after on the basis of waivers of sulfur restrictions for a few months. If this country is to begin soon to cover more of its fuel requirements from native coal resources, new mines must be opened. For this purpose it is essential to provide assurance to power companies of their ability to use coal over an extended period, so that in turn they could enter into long-term contracts with coal producers which would justify the investment in opening the new coal mines needed to serve these plants.

Of course, any such long-term relaxation of air pollution standards should be coupled with a requirement to install either stack gas cleaning equipment or equivalent desulfurizing facilities as soon as such facilities are demonstrated to be commercially available. I might say that research and development on stack gas desulfurization and of coal-to-gas and other methods of desulfurization prior to burning are in relatively advanced stages and will almost certainly be available on the commercial market within the next 5 years.

At present the final decision on the use of coal rests exclusively with the environmental authorities, who seem reluctant to consider the tradeoffs in terms of jobs, risks of blackouts, and economic welfare. The current situation raises the question whether decisions on tradeoffs should be confided to environmental specialists alone—speaking on behalf of our own special constituencies—or whether they should

be made by officials with the broad mandate to pursue the public interest.

ADMINISTRATION OF ALLOCATION AND RATIONING RESPONSIBILITIES

Not since World War II has this country faced such a demanding problem in resource allocation as is presented now by the fuel shortage. It is evident that until the last week or two, at least, the difficulty of the problem was seriously underestimated. We must face up to the requirements in men, money, administrative competence and organizational drive which are essential to handling the problem.

In World War II, President Roosevelt set up the War Production Board, the Defense Plant Corporation, and numerous other wartime agencies, and gave them adequate authority and means to accomplish their mission of regulating the flow of materials in order to support the war effort. We face a comparable challenge today and it cannot be discharged with a platoon of people, detailed for short periods from other agencies. The problem is too big to be handled with the left hand by the Internal Revenue Service or from one of the back rooms in the Executive Office Buildings.

The Congress has been well ahead of the administration in recognizing the seriousness of the fuel crisis. The emergency legislation already passed, or now in advanced stages of congressional consideration, provides broad grants of authority which the administration has now come to recognize are indispensable. If we have finally overcome the illusion that we can handle this problem with a corporal's guard and a trickle of money, perhaps we are on the way to dealing effectively with the fuel problem. The recently proposed shift of responsibility for energy policy matters from the back rooms in the White House to a Cabinet level agency, under Treasury Under Secretary Simon, is a welcome step in the right direction.

The Congress will need to pay close attention to whether the administration is still underestimating what needs to be done. We do not have much time to spare in appraising what is involved and putting ourselves in position to meet not only this winter's fuel emergencies, but also the even more serious emergencies which will occur in future years unless we act now to prevent them.

THE PROGRAM FOR THIS WINTER

What I have said already suggests the steps which seem to me to be necessary to prevent unemployment and cold homes and factories this winter. Obviously, the refineries must be required to maximize the production of heating oil at the expense of gasoline. This step would make available several hundred thousand barrels of heating oil a day.

The corollary is that gasoline rationing must be imposed, and in my judgment, very soon, to prevent shortages of gasoline next year which will not merely curb pleasure uses but curtail essential needs for transportation as well.

The logistical requirements for averting disaster wherever it may threaten must be fully explored. There will probably be a need not only for allocation directives but also for large physical movements

of petroleum products outside of normal shipping arrangements Tankers must be available and if American bottoms are not adequate it may be necessary to amend the Jones Act to permit the use of tankers of foreign origin.

Drastic cuts must be made in the use of all fuels. Homes with gas and electric heat should not be spared. Restricting the use of natural gas and electricity presents much more complex problems than in the case of oil, but I believe they are not insuperable. Needless to say the restrictions must be imposed on a national level because otherwise the areas which make the sacrifice would not necessarily receive any benefit by increased availablity of fuels for essential needs.

Finally, it is essential to accommodate environmental controls to the realities of our fuel situation, and to shift as much of the fuel burden to coal as the coal industry can handle. The waivers should also permit the burning of high sulfur oil of either domestic or foreign origin. With such a program I believe we can get through the winter on the basis of shared sacrifices and with a minimum of unemployment.

The attached table to my statement, Mr. Chairman, summarizes the administration's estimates of this winter's shortages and its proposals to resolve those shortages. The information is taken from a fact sheet associated with the President's November 25, 1973, energy message, in which the shortfall assumed is 17 million barrels a day. You will notice in this table the figures on the shortfall by product, and then the effect of the refinery shift which has been proposed. The net shortage in the third column is the same as the one we started with, because the effect of the refinery shift was only to change the volumes among the products and not the totals. The table also shows the percentage of demand which is affected.

In the textual column at the right-hand side of the sheet are the various measures which the administration has proposed to achieve reductions in each of these product categories. And it is these measures which I say are of very doubtful adequacy for the purpose.

[The table referred to above follows:]

ADMINISTRATION PROJECTIONS OF NEAR-TERM PETROLEUM SHORTFALL AND PROPOSED REMEDIES (FROM FACT SHEET ASSOCIATED WITH PRESIDENT'S NOV. 25 ENERGY MESSAGE)

Last quarter of 1973: 1,400,000 bbl/d; 1st quarter of 1974: 3,500,000 bbl/d; 2d quarter of 1974: 3,000,000 bbl/d

DETAIL FOR 1ST QUARTER OF 1974

[Thousands of barrels per day]

Product	Unadjusted shortage	Refinery shift	Net shortage	Percent of demand	Resolution by administration
Jet fuel	398	−225	173	14	Reduction in flights (? also speeds), 220,000 bbl/d. (leaves room for restoration of inventories).
Gasoline	712	700	1,412	22	Reduction in business/government use by 15 percent, 300,000 bbl/d. Reduction in passenger car use by 24 percent, 1,100,000 bbl/d. Measures include lower speed limits (200,000 bbl/d), station closings (50,000 bbl/d) and others such as high prices or possibly rationing (? 1,-150,000 bbl/d).
Middle distillates	898	−400	498	11	Reduction in residential heating by 6° or 15 percent and commercial by 10° or 25 percent, 490,000 bbl/d. Reduction in industrial use by 10 percent, 40,000 bbl/d. Reduction in gas turbine use by 50 percent, 150,000 bbl/d. Leaves 200,000 bbl/d margin for severe weather.
Residual oil	1,052	−200	852	24	Conversion of powerplants to coal, 250,000 bbl/d. Reduction in space heating by 15 percent, 90,000 bbl/d. Reduction in industrial use by 10 percent, 60,000 bbl/d. Reduction in electricity use by 3 percent, 300,000 bbl/d. Shift of gas from residential use to powerplant use, 100,000 bbl/d. If needed, coal-fired power diverted from uranium enrichment (1,400 MW), 53,000 bbl/d.
Other	401	125	526	14	
Total	3,461	.....	3,461	17	

Mr. SWIDLER. In my view, the projected steep cuts in gasoline consumption cannot be achieved, certainly not equitably, without gasoline rationing.

Furthermore, the administration underestimates the need to reduce gasoline consumption. U.S. refineries will need to turn out more residual oil—and consequently less gasoline—than the administration ex-

pects because it has exaggerated, for example, the opportunities for converting powerplants from oil to coal. According to administration's estimates, these conversions could conserve about 250,000 barrels of residual oil per day during the first quarter of 1974, requiring the equivalent use of about 60,000 tons of coal per day, roughly 4 percent of present daily U.S. coal production. I doubt that we can increase coal mining and transportation by an average of 4 percent through the first quarter of 1974, and if I am not mistaken, at the Monday meeting in which Mr. Simon spoke about his plans for the winter, the figure that was mentioned was about 45,000 tons of coal, as the measure of flexibility in supply.

Furthermore, it seems doubtful that coal conversions could occur quickly enough to meet the stated objective. Everything else aside, it is questionable whether the environmental authorities will grant the waivers and variances necessary to accomplish these projected conversions quickly enough to validate the estimates which the President announced.

THE PROGRAM FOR INDEPENDENCE BY 1980

This country has the basic fuel resources to achieve independence of imports, and even to contribute to the security of its allies. This is not to say that a sophisticated energy policy would necessarily dictate complete independence, because a degree of risk is probably acceptable if within the limits of ready contraction of demand without hazard to the economy, and if covered by other protective measures, such as storage.

I interpret the President's goal as contemplating independence to this degree, and not necessarily a total rejection of all imports. Nevertheless, achieving even such a degree of independence would necessitate a program of unprecedented dimensions to add to fuel supply by converting coal to oil and gas, and by augmenting the national capability for use of nuclear fuels.

If we are to consider the plight of our allies as well, and help to rescue them from insecurity and consequent domination of their foreign policies to the prejudice of U.S. interests, the program must be further enlarged. To my mind the program will not be adequate unless it does consider the international situation.

Even if a specific program were to be developed and announced to achieve independence by 1980, however defined, it could not be accomplished by 1980 and I believe this is now generally recognized.

Much of the technology upon which such a program is dependent is still in the demonstration stage, and we shall be lucky to complete a few demonstration plants by 1980. However, 1985 might be a realistic target date, and I would not quarrel with the President for setting the earlier target.

What is distressing is that the various proposals thus far announced for achieving the goal are totally inadequate, and if no more is done than the President has mentioned we shall be in far worse shape in 1980 than we are today.

One substantial element of the President's program is for the Alaska pipeline. By the late 1970's the pipeline should be delivering at least 2 million barrels a day. However, by 1980, even if the rate of growth in energy use is held to half the level of the last 5 years—

which is about 4½ percent—if it is held to 2 or 2¼ percent, we shall need for independence about 7 million barrels a day of oil or oil equivalent, in addition to the need to make up at least a part of the present deficit which is being met by imports.

For a 1980 program we should be planning on about a 10 million barrel increase of capacity and for 1985 for at least 15 million barrels, reduced by whatever savings can be attained in excess of the reduction I have mentioned in the 4½ percent growth rate to the 2¼ percent growth rate.

Keep in mind the total capacity of the domestic oil industry is 11 million barrels a day, including both crude and natural gas liquids. Domestic petroleum production peaked in 1970 and has been declining since then. It is doubtful that the Alaskan pipeline will do more than compensate for the decrease in the productivity of the fields of the lower 48 States. In any case, whether the goal is to be new capacity by 1980 of 5 or 10 million barrels, or by 10 or 20 million barrels a day by 1985, the program would be so huge as to challenge even the American genius for large plans and giant construction programs.

To repeat, for the goal of 10 million barrels a day, we would be duplicating the entire productive capacity of the domestic industry. That is the scope of the program we are talking about, Mr. Chairman.

The other elements of the President's program are of doubtful importance in augmenting fuel supplies in the 1980 time frame. Let me mention them briefly. Improvement in nuclear licensing might shorten the construction time from the present 8 or 10 years to perhaps 5 or 6 years. At best it seems clear that no nuclear plant can be completed by 1980 for which a license application has not yet been filed. I doubt that this country is willing to accept unlimited numbers of nuclear plants of the present generation as the complete answer to the energy shortage. Even with streamlined licensing the state of the art is such as to make it difficult to predict when a new plant will be available on a dependable commercial basis.

Deregulation of natural gas prices is a complicated problem. I shall only say that, by the admission of the petroleum industry, with or without deregulation this country will have difficulty in maintaining the present level of natural gas productivity of about 22 trillion cubic feet a year. Availability of Alaskan natural gas would be a big help, but it is a long way from realization. The cost is very large. I have heard $8 billion mentioned as the most recent estimate. It seems doubtful that the money can be raised in the absence of a treaty with Canada which would assure the continuity of deliveries to this country.

A sound coal stripmining bill is probably essential as a part of the underpinning for expanded fuel supply, but it will not in itself assure the construction of plants for converting coal to gas or coal to oil. Streamlined procedures for certification of powerplants—a final recommendation of the administration—may assure adequate generating capacity, but except for the nuclear portion does nothing whatever to assure a fuel supply for the generating plants or for the economy at large.

The missing elements in the program will require the attention of Congress itself. If fuel supply and demand are to be balanced something must be done both to restrain the runaway growth rates of recent years by an effective continuing conservation program, and to

assure the growth of fuel supplies adequate to meet the demands which will occur.

In the last 5 years energy growth has taken place in this country at the rate of about 4½ percent a year, compounded, as I mentioned. For the last half century the growth rate was only about 2½ percent. For many years the rate of growth in energy use was slightly less than the growth in GNP, but in the last decade it has exceeded the GNP growth rate. For this surge of energy demand there are many causes, among them the cheapness of fuels, the promotional forces behind intensive energy using equipment, especially the automobile, and clean air legislation which has affected adversely the energy efficiency of both stationary and mobile equipment.

It seems apparent that much of our energy is totally wasted and much more is utilized to very little social purpose. If we have the will and discipline, I see no reason to doubt that an intensive energy conservation program could hold the rate of growth to well below the long-term historical rate of 2½ percent. The program would include tax or other discouragement on the production of heavy cars with large horsepower—and on that Congress has already begun to speak—of energy incentive options, such as air-conditioners, which I have not seen included in the congressional proposals thus far, as well as support for mass transit, the establishment of strict energy conservation standards for new buildings, and the establishment of high standards of efficiency for energy-intensive appliances and apparatus such as air-conditioners.

None of these proposals would involve a drastic change in the American lifestyle, but in saying this I do not mean to imply that Congress should not dig into the whole question of waste in the American economy, including the development of quality standards which would curb forced obsolescence and satisfy the material needs of American citizens with a smaller output of better things.

On the second missing element, the principal reliance in building up fuel capability in this century must be on the use of coal—and perhaps later of shale—to supply new oil needs, to compensate for declining availability of natural gas supplies, and to power utility boilers and other stationary generators requiring clean fuels.

In all three areas commercial technology is either not yet available or is not developed to a stage of efficiency which would warrant long-term reliance. Moreover, in dealing with developing technologies, private enterprise may not be willing to rush forward with many billions of dollars to build plants which could prove to be obsolete before they are completed, especially when confronted with the specter that the Arab States could revise their policies and begin to export oil at far lower prices than the cost of synthetic fuel. After all, the lifting cost in the Middle East is only somewhere in the order of 10 or 20 cents a barrel, which provides a great deal of flexibility in the pricing program of the Middle East governments.

What is needed are a combination of crash programs in research and development and the construction of a number of demonstration plants using available technology while work in improvement is being carried forward.

It seems doubtful that private industry can carry this load alone. The Government is already committed to the programs for research

and development, but they are still too small and are moving too slowly. So far as I know little is being done on a start of the massive construction programs which are needed to convert coal to oil and gas. Government guarantees, either of funding or purchase of the output at compensatory prices, may prove necessary. The practical requirements for assuring that the necessary construction programs are put underway need prompt and careful investigation.

Perhaps the first need is to frame a specific construction program, in light of our needs, available technology, and the plans of the private sector. For one thing, Mr. Chairman, it is rather astonishing that despite our tremendous deficit in refining capacity, no new refineries are under construction. A number, perhaps a half dozen, have been announced. But plans on all of them are suspended, so that we are not at the moment attempting to cure this very serious gap in energy adequacy.

We cannot become independent by 1980, but by using the best technology available, we might by 1980 be able to care for a major part of the growth to be expected between now and then, which would be something in the order of 4 million barrels a day of oil and oil equivalent, about 10 percent of present energy use. Such a program would amount to about 40 percent of the capability of the entire domestic oil industry. That, in itself, would be a very large program. The cost would be many billions of dollars, but the construction cost at least could and should be self-supporting if the Government protects its investment by assuring that any production from cheaper sources, either by imports or improved processes, would be taxed enough to assure the profitable operation of the initial plants.

A serious problem in augmenting coal supplies is the present primitive state of coal mining technology. Little has been spent on this problem in the past, and only a small amount of money is earmarked for the purpose in the current research budget. If we are to increase our dependence on coal, and triple or quadruple coal production to the two or three billion tons a year level, this area must be given far greater attention, or the whole program may bog down for lack of miners and mine production capacity.

CONCLUSION

This testimony deals with a subject on which national thinking has not matured, and on which the shape of the problem, even the facts, are elusive and constantly changing. A statement that was prepared even a few days ago has a high degree of obsolescence. This statement is in the nature of thinking-out-loud, rather than a matter of solid numbers and settled views.

I have not tried to present a comprehensive program for meeting the long term energy problems facing this country. They are entwined with many difficult policy questions, involving not only this country's domestic affairs, but its relations with other countries of the world, the affluent and the nonaffluent, those with major energy resources and those without, those rich in other materials and those without such resources, some friendly and others following conflicting courses. It seems obvious that the role of the Government will change and probably expand to assure greater responsibility for energy adequacy

in the face of the breakdown of present arrangements for satisfying energy needs.

There must be close dovetailing of tax policy, conservation, environmental and developmental programs. There is much room for differences of viewpoint. I do not know any way to solve the energy problem quickly or cheaply. Nevertheless, it is essential to make a start. Announcing goals accomplishes nothing, except as it stimulates practical thinking on how the goals are to be achieved. I have tried in my testimony not so much to provide the answers as to suggest some of the questions.

Thank you for this opportunity to appear before you.

Chairman REUSS. Thank you very much, Mr. Swidler, for your most helpful statement.

I note particularly your criticism of the Rip Van Winkle approach of so much of the administration's thinking on the energy crisis. This needs to be called to the public's attention.

I would like to call your attention—and not many are making this point—to emphasize that we will be thinking not only about the energy problem in the United States, but the energy problem of our allies, friends, and acquaintances the world over, not just for strategic and military reasons, but for the general purpose of trying not to be selfish and hogging everything. We have done very little of that. We have said some kind words to poor Holland, but mainly because they were about the only country that aided with us in a recent military matter over in Europe.

Mr. SWIDLER. Yes—if the energy crisis is to drive us into total isolation, if it is to lead us to abandon our friends and our friends to abandon us, then indeed it will have achieved the purpose that I think unfriendly governments may have intended in imposing these shortages upon us. We cannot afford to abandon the rest of the world.

Chairman REUSS. What shall it profit the United States to swim in fuel once again if it loses every friend it ever had?

Mr. SWIDLER. If the rest of the world is totally dependent upon a Middle East dominated by the oil producing countries and their foreign policies, and is required to toe the line on every international question that comes up on which the Arab States have a viewpoint, we are going to find ourselves in a very unfriendly world.

Chairman REUSS. Now let me take up a couple of more specific matters with you. In your statement you pointed out the need to furnish sufficient fuel to keep utility boilers operating. You point out that the only way to do that, at least in the short and medium term, in the next 5 years, is by increasing the use of coal. And that includes some unenvironmental high-sulfur coal. You take the environmental authorities to task, saying that these tradeoff decisions shouldn't be confined to environmental specialists alone but should be made by officials with a broad mandate to pursue the public interest. Well, I am sure you didn't really mean an implication which sensitive people on the subject like myself see in it. But environmental authorities, if they can be said to represent a special interest, represent quite a broad special interest, like all the people who live on the Earth, don't they?

Mr. SWIDLER. Well, they represent all the people, but they represent them in a special relationship. You read, for example, statements by some of the people who make these decisions, and they say that they

don't mind proceeding from ignorance, because if the error is in favor of people who breathe—I think I am quoting from one of their leaders—"I am for people who breathe."

Well, people who breathe are the same people who work and who eat. But he doesn't see them in their eating or working relationship, but only as breathers. The environmental authorities represent people, they don't represent their total interests.

Chairman REUSS. I don't know who this environmental authority is, but he needs a new speechwriter.

Mr. SWIDLER. This was an off-the-cuff remark.

Chairman REUSS. Anyway——

Mr. SWIDLER. There is an awful lot of extremism on environmental matters.

Chairman REUSS. I agree with you that we need to relax standards for the short term. I also am substantially persuaded by you that in order to get coal companies to produce—they aren't going to produce for a 3-month supply or 6-month supply—you probably have to extend the relaxation of standards for a period longer than a year. How much longer I want to hear a little more about. But generally I am not hostile to your suggestions.

There is one thing missing from your scenario, the inclusion of which would make me feel a lot better about the ultimate tradeoff. You say: "That relaxation of air pollution standards should be coupled with a requirement to install either stack gas-cleaning equipment or equivalent desulfurizing facilities, as soon as they are commercially available." Then you say that: "R. & D. on these problems has been going pretty good and ought to be available within the next 5 years."

Now, the fact is—and the report of the Subcommittee on Conservation of the House, which I chair, demonstrated 3 or 4 years ago—that research as of then into stack-gas desulfurization was simply pitiful, practically nothing was being done about it. Don't you think that this country should mount a joint public and private research-development and demonstration effort to produce these stack-cleaning facilities and other desulfurizing facilities just as soon as humanly possible? Don't you think that if we go at it with a systems approach—moon shot, Manhattan project approach, we could do pretty good on that?

Mr. SWINDLER. Yes, I would. And I recommend it, the intensification of the R. & D. drive.

Now, since the period you spoke about, 3 or 4 years ago, there has been a great acceleration of research in cleaning up coal so that it can be burned without environmental offense. I guess there are 30 or more projects going on throughout the country, with a total cost of something on the order of $300 million, in various stack gas-cleaning processes. Some of them, it seems to me, are probably in the wrong direction, because they result in byproducts which in turn create a disposal problem. They don't recirculate the limestone or the other agents that are used to take out the sulfur. I think that some of this research is going to prove out. There are perhaps several ways of doing it that will produce either elemental sulfur or a relatively high quality sulfuric acid that has a market, at least a local market, in some places.

Now, there are other ways of doing the coal cleanup job in new plants which may turn out to be much cheaper—coal to gas, for example, or coal to oil, might turn out to be a much better way to get at

the sulfur than to burn the coal while it contains the sulfur and then try to get the sulfur out of the very dilute gas streams in the stacks. This is a problem that we are going to lick, and we are going to lick it in the next few years. It is unfortunate that we don't have an efficient process commercially available today. We are still apparently a few years away from that.

Chairman REUSS. Needed in addition to the R. & D. that we have been discussing, in this coming age of general shortages, is some sort of allocation program so that the factories which will be making these new stack cleaners, or coal-to-gas or coal-to-oil converters, get the materials they need, and the energy they need in order to operate.

Mr. SWIDLER. Yes; it seems to me that this is part of any overall allocation program—as well as oil drillers, I might say, people who produce fuel and fuel processing equipment should have a high priority.

Chairman REUSS. Yes. Staying with how you reconcile the problem of the environmentalists and the suppliers of electricity—a controversy which I believe has to be reconciled—and recalling that we said a moment ago that what is needed is the Manhattan project approach or the moon shot approach, which worked—would you please tell me who is the General Groves or the Jim Webb of this one? I don't see anybody, and I think we need somebody.

Mr. SWIDLER. I don't know that I could pick any one figure. I confess I have a little trouble myself trying to get a clue as to what is the lead technology. I serve as a member of the advisory committee of the Electric Power Research Institute, the new industry overall research organization. I have been pressing to find out from Mr. Chauncey Starr, the head of that agency, as well as some of our own people at the pubic service commission, who are fairly knowledgeable on energy research. Apparently, there is no single technology which is the lead horse, nor is there any one person who has that kind of a command of the available alternatives. I am not sure that the present energy R. & D. problem is strictly analogous to the Manhattan project concept. There are too many ways to go and too many kinds of equipment that are needed. While flue gas desulfurization has great charm, because it is adaptable to existing plants, it could well be that it is not the best general way to go for new plants. You might be able to operate a good deal more efficiently in desulfurizing the coal rather than the stack gases. There is a whole range of things that we should be working on, some for the short term and some for the long terms. And the plans that are now in the mill for establishing an energy research administration with a $2 billion a year spending authorization should produce someone who can mastermind that kind of a program, but it will be a more difficult program adminstratively than the Manhattan project, even though some of the specific research problems may not be as difficult.

Chairman REUSS. On the subject of residual fuel for electricity generation on the east coast, and specifically with respect to this winter and 1974, what can be done to meet the immediate shortage? Where are the refineries which might step up their production? How is it going to be transported to the east coast? And what if these actions aren't taken? Are there contingency plans to allocate electricity? We have got a short term, very urgent problem here.

Mr. SWIDLER. The Public Service Commission of New York has required the power companies of New York to produce contingency

plans based on various levels of emergency, including the worst. And we have coordinated the power systems of the State so that they would all contribute to trying to make up a deficit in any part of the State.

But some of those plans involve at the worst some extreme hardship—rotating blackouts, so that people would get a supply of electricity only a part of the day, depending on how severe the shortage was. Now, I hope we don't come to that. I don't think we need to come to that. When you consider, as I said at the outset, that our overall energy deficit is only in the order of 10 percent, and that a good many of these fuels are interchangeable, this becomes a problem of management of fuel resources to see that the areas and the products that are suffering the most are taken care of by shifts, either area shifts or shifts in the use of fuel. One of the things that ought to be done in our area is to assure fuel transport. At least 95 percent of the powerplant fuel on the east coast is imported, and half of it is imported from countries subject to embargo.

We have a very severe situation, and the figures of 17 or some other percent of shortage are not meaningful in relationship to keeping power supply going on the east coast. When I raised this question the other day with Mr. Simon, he said he was working on some shipping arrangements, but he couldn't go into detail. This is what it takes, because without transport capability we may be in very big trouble.

One of the other things that we need to do, of course, is to shift as much of the load as possible, get some of these generators running on coal. So far, because of the fact that three environmental authorities must agree, the city of New York, the State of New York, and the EPA, nothing has happened in New York City, although the power company's variance application was filed 6 weeks ago, as I recall, and time is running. There are things to do if we buckle down and do them. We have been met so far by inability to get quick decisions, particularly in Washington.

Charman REUSS. Let us pray.

Thank you very much, Mr. Swidler. Feel free to stay or go.

Mr. SWIDLER. Thank you very much.

Chairman REUSS. Mr. Heller, please proceed.

STATEMENT OF WALTER W. HELLER, REGENTS' PROFESSOR OF ECONOMICS, UNIVERSITY OF MINNESOTA

Mr. HELLER. Mr. Chairman, once again in today's energy crisis the United States is learning the costly lesson that we can't manage economic policy as if there were no tomorrow. But we seem to be slow learners, Rip Van Winkles, in your term, Mr. Chairman.

Witness the economic crisis of the seventies that have caught the country and the White House by surprise, and after long delay have been met by steps the President said he would never take. For example, in 1970–71 the hemorrhaging outflow of U.S. funds finally forced the White House to end dollar convertibility and devalue the dollar, as this committee had foretold.

Also, in 1970–71 stubborn and self-propelling inflation finally led to the shock therapy of wage-price freezes and phases.

In 1972–73 the startling shift from surplus to shortages in U.S. agriculture finally led to removal of acreage limits and most import quotas and price supports.

And now the growing energy shortage, underscored by the Arab cut-off and the explosion in oil prices, has belatedly led to oil allocations, and will, I believe. lead to more drastic measures like rationing or stiff gasoline tax increases.

One can't proceed to an understandable appraisal of the impact of the oil crunch on the economy without specifying certain critical assumptions. And let me start with one simple proposition for the longer run. In spite of Mr. Nixon's complacent assurances that the energy crisis is only "a temporary problem," and that "we will once again have those plentiful supplies of inexpensive energy," I think the Arab oil problem is here to stay, in two critical senses.

First, the era of cheap oil and gasoline is rapidly fading into history, never to return. The debate over whether we should cut gasoline use by higher prices, by higher taxes, or by rationing, may have obscured the fact that petroleum prices are already exploding all around us. Look at the facts:

Foreign crude oil: Persian Gulf oil has jumped from $2.50 a barrel earlier this year to $4.90 today—and what was it, about $17.40 that the Iranian auction commanded yesterday? Other prices have changed correspondingly.

Domestic crude: Protected by import quotas, U.S. crude drifted upward from $3 in 1970 to $3.40 a year ago to $4.17 today for old oil and uncontrolled prices on new oil, which is going for $2 or $3 more. In some places it has doubled. And last week White House sources were quoted as saying that the decontrol of "old" oil prices is "not a matter of if, but when."

Wholesale prices: The BLS reports that wholesale prices of all fuels are already about 50 percent above a year ago, having jumped 19 percent in November. And refined petroleum products, according to the BLS, are up 90 percent, with 35 percent of that jump occurring last month.

Meanwhile down at the pump, the low-test gas that I buy in the Twin Cities has risen from 28 cents a gallon at the cut rates and 33 cents at the majors to 44 cents wherever I turn. That's already 35 to 50 percent, and retail prices of all petroleum products seem headed for another 25 percent rise in the coming year.

In short, price changes that will have major effects on the rate of inflation and on patterns of both consumption and production are already in place, or to coin a phrase, in the pipeline.

As a matter of fact, I have a strong impression, reinforced by Mr. Sawhill's and Mr. Stein's testimony here yesterday, that we are backing into a the-sky's-the-limit pricing solution to the oil crisis. While prices sneak up closer to levels that will clear the market and fill the pockets of the petroleum industry, we are protecting comfort and convenience at the expense of jobs and income.

Now, second, in spite of Sheik Yamani's assurances that the Arab sheiks will never again, if we settle the Israel border questions, have any reasons to embargo oil exports to the United States, I think we would be best advised never again to treat Arab oil exports to us as anything but interruptible service energy. Even if the oil valves aren't turned on and off for political reasons, we shouldn't forget that the OPEC oil-ogopoly will henceforth manipulate its oil output up and down to suit its profit and portfolio objectives. When they want

more dollar assets the valves will open, and when oil in the ground looks relatively more attractive in their portfolio, the flow will be choked back or shut off, quite apart from political considerations.

It seems to me to follow that our determination to develop alternative domestic sources of energy supply, and cut wasteful uses and nonessential demand, must not succumb to the euphoria of an eventual resumption of Arab oil flows. A credible and decisive commitment to develop our own fossil fuel capability and push ahead on more exotic energy sources will serve both the economic interests of this country and those of our allies who have been hurting and smarting from our ravenous and growing appetite for Middle East oil. We have in effect been exporting our shortages. And the rest of the world has rightfully resented it. And I believe that our efforts to cut energy use and expand supply will pay off for Europe and Japan and others in the form first of a more assured flow of Arabian oil to them and second, in price levels that are no longer supported by an unquenchable U.S. thirst for that same oil. From Joe Swidler's testimony we know that this won't be easy, but the effort is important both for this country and for our friends throughout the world.

So I start with the basic assumption that high prices of energy are here to stay, and that we can't afford to turn off the drive for potential self-sufficiency when OPEC turns on the valves again.

Let me quickly specify five other assumptions.

First, my working assumption is that the oil shortfall will be about 3¼ million barrels a day in 1974, consisting of a supply cutback of 2 million barrels, coupled with a normal demand growth of 1¼ million barrels. I am a little concerned, by the way, that my 3.25 million is all that close to Mr. Sawhill's 3.26. But, nevertheless, I will stay with it for the moment.

Second, for the sake of simplicity, I will assume that the Arab oil embargo will not be lifted in time to affect the 1974 oil outlook very much.

Third, under the whiplash of economic crisis and political necessity, I expect the hitherto timid and vacillating White House policy to be galvanized into decisive action to curb wasteful and nonessential energy use in ways that will protect and restore jobs and output.

I guess that confirms my reputation as an optimist.

I expect industry, after an initial period of confusion and dislocation, to adapt pretty well to high costs and short supplies of oil by switching to coal, by more intensive labor use, by substituting one raw material or component for another, and by eliminating sheer waste.

I believe, by the way, that industry has been a little bit more forehanded in anticipating the energy crisis than either the administration or the rest of the country, or , for that matter, the general run-of-the-mill economists of the country.

Fifth, in the shortrun, I assume that the price elasticity of demand for gasoline is about minus 0.2, or slightly more. In other words, a boost in gasoline prices from 40 cents to 50 cents a gallon, or 25 percent, should cut gasoline consumption by 5 or 6 percent.

Now, looking at the impact of the energy shortage on the economy, by far the largest jolt to the economy from the oil boycott will come from the demand side, from a cut in consumption of cars, campers, boats, tourist services, and other things that are complementary to

gasoline. And, as a highly tentative estimate, I would put that at a nearly $15 billion annual rate in 1974, of which $7 to $8 billion, or about half, would be the drop in auto purchases. This implies a slump in unit sales to a range of 8 to 9 million cars—that would include one and a half to 2 million imports—and a decided shift to small cars. Other demand complements associated with autos would account for much of the balance.

Although there would be sizable shifts in demand to other areas—one thinks of TV sets and other forms of home entertainment, swimming pools, coal and clothing and the like—one can project a net cutback of consumer demand to the tune of $8 to $10 billion during 1974 as a reasonable first approximation.

On the investment front, I should think that hesitation and readaptation of investment plans might cut $1 to $2 billion from business fixed investment next year. One can also visualize a loss of real value-added in the petroleum industry of perhaps $3 billion.

Now, what about the energy-related supply bottlenecks and output interruptions which loom so large in the news accounts? During the period when policy is still floundering in its attempt to sort out the essential from nonessential uses of energy, such supply interruptions and dislocations will indeed be disturbing. But the more we force the cutback in energy use on nonessential automobile use, space heating, and industrial waste, the less will be the impact on supply. For 1974, a host of qualified observers are beginning to conclude that supply interruptions induced by the oil shortage will have only a minor effect on the year's GNP. Adding up these direct negative effects, and taking account of the induced effects through the dynamic multiplier process, one arrives at a cutback of $25 to $30 billion, or just over 2 percent in 1974 GNP, owing to the energy shortage. Since this markdown will be imposed on a softening economy that was already expected to slow down to a 2 to 2½ percent rate of advance for the year, the energy-adjusted projection represents essentially a no-growth situation for 1974 as a whole.

We also have to look at the pattern over the year. And while I foresee not too dark a picture of 1974 as a whole, during the next several months the economy will suffer from temporary paralysis of business and consumer spending decisions in the face of extreme uncertainty, possible shortages, serious regional imbalances, and the stock market and related anxieties. So the first half of 1974 will look like—and perhaps by traditional standards will be—a recession.

With the president of the National Bureau of Economic Research sitting next to me I shouldn't speak of what is going to be defined as a recession. Perhaps he will address himself to that point.

We can expect a drop in real GNP at an annual rate of about 1½ percent in the first quarter, and 1 percent in the second.

The processes of economic adaptation and of suppression of nonessential oil uses should be far enough along by mid-1974 to permit economic expansion to resume in the second half of the year—as the readjustment of consumer spending continues, and as investment grows in redirecting the economy toward energy conserving production processes and buildings, compact cars, larger coal output, and so on, economic recovery should be moving strongly in 1975.

Now, turning to the inflation impact, the direct effects of oil price boosts plus adverse effects on productivity—not to mention such omi-

nous portents on the labor front as the reopening of the teamsters' contracts and other signs that this year's wage moderation may turn into next year's labor militancy—will add perhaps 1 to 2 percentage points to the advance in the cost of living for 1974. In other words, a rise of 7 to 8 percent in the first half of the year in the consumer price index, and perhaps 6 percent in the second, now seems in the cards. A rise of close to 6 percent in the GNP deflator during 1974 can also be expected. I notice that Mr. Stein said yesterday: "A 50-percent increase in price of petroleum products might add as much as 3 percent to the cost of living increases next year." That would raise those inflation numbers. And I suppose under Murphy's law I should assume that it will be 3 percent—but I am making the more optimistic projection of a 1- to 2-percent add-on.

Accompanying the drop in output will be a large and distressing jump in unemployment. It is likely to rise above 6 percent by the second half of the year.

And now as to policy, let me address myself first to the stabilization policy implications of the foregoing scenario. First of all, the extra price jolt from the oil shortage in 1974 should not—and I repeat not—be taken as a signal for monetary tightening, any more than the 15 percent jump in food prices was in 1973. Those shortages, to use the words of Arthur Burns in his recent defense of monetary policy, "hardly represent either the basic trend in prices or the response of prices to previous monetary or fiscal policies." They represent *sui generis*, supply-induced exogenous shocks. To attempt to hammer down price increases in food and oil—two sectors with flexible prices and inelastic demands—by restrictive monetary policy would wreak havoc on the rest of the economy.

Since an easier monetary stance was already in order before the cutoff of most Persian Gulf oil, and since the major impact of that cutoff on GNP will come through discouragement of consumer spending, the Federal Reserve should definitely move in the direction of ease. In so moving, I should add, it ought to use interest rates, not money supply, as its primary guide under present circumstances. For example, that big spurt in the money supply in November was mainly the result of a big jump in precautionary demand for money as a result of consumer and business indecision and anxiety. And, as such, it is distinctly a false signal for cutting back the growth in money supply.

We should concentrate, as I say, on interest rates and recognize what is happening to money supply increase as a result of these demand factors.

So following its initial move last week in cutting back reserve requirements on large CD's the Federal Reserve should strive to bring the Federal funds rate down sharply from its unduly high level of 10¼ percent.

Now, as to fiscal measures, the general directions of policy seem clear enough. We should remind ourselves that we had a startling upsurge first in food prices, and now in fuel prices, and that the net effect has been sharply regressive. Although food represents a little above 20 percent of average consumer spending, this rises to 40 and 50 percent in the very low-income groups. For example, the poor family that spends 40 percent of its disposable income on food finds that the 20 to 25 percent leap of food prices in this current year rep-

resents a cut of 8 to 10 percent in real income. If we add to that a 2- to 3-percent cut by surging energy prices, the implication is clear: Anything we do on the fiscal front in 1974 must as a matter of equity transfer funds to the lower income groups.

The case for tilting fiscal policy in this direction is reinforced by a consideration of the pattern of energy demand across income groups, because the larger the family income, the larger the proportion that is likely to go for uses of energy that society would regard as nonessential or downright wasteful. And especially if we increase excise taxes to curb gasoline use we should make restitution—you might call it reparations—to lower income groups, by cutbacks in social security and income tax withholding and tax refund to the poverty groups not covered by such withholding.

And, by the way, Mr. Chairman, I don't think the problem of the 10 percent or so of the population that is not covered by the social security and income tax withholding should present any great problem in carrying out this particular recommendation. I think we have the ingenuity to find ways of getting money back to them if that is required for this kind of a redistributive fiscal policy. After all, we refund something like $22 billion a year in income tax withholding. We ought to be able to figure out how to cover 100 percent, not just 90 percent of the population.

I don't mean to say, however, that one has to stay within the framework of an energy tax to carry out the appropriate distributive objectives, especially in this period when we have sharply cut the real income of the lowest income groups, and when a great many unskilled and lower income persons will be thrown out of work as a result of the energy crunch—it is not just the automobile industry, but a lot of service industries that employ unskilled and low-income people who are being hit. It would make good economic and humanitarian sense to restore some of the cuts that we have made this year in social services budgets, to expand the public employment program and unemployment compensation, and to eliminate payroll taxes on persons below the poverty line.

Turning to the energy field itself, I don't mean to imply by the above that I would rely on the price mechanism, aided and abetted by tax hikes, to ration gasoline and effect the entire 25 to 30 percent cut that is vital to preserve the supply of petroleum required to sustain employment output. Nor will the "do-it-yourself" and "catch-as-catch-can" system of rationing do the job. We are going to have to ration gasoline, there just isn't enough to go around, it is either a matter of having a fair and rational method of doing it or a capricious do-it-yourself method Yet, that's precisely what is implied by the present system of allocations, combined with the squeezing down of refinery output of gasoline. It can only lead to long queries and mad scrambles at the gasoline pumps, gray market payola, corrosive favoritism, tie-in sales, and sweetheart deals at the service stations—not to mention unwarranted profits.

For all its blemishes and administrative difficulties, an outright system of consumer rationing administered under rules developed by Government, perhaps administered with the help of citizen rationing boards remains the fairest, quickest, and by a large margin the most acceptable way to go. The 71 to 21 percent margin in the Harris poll

doesn't suggest, by the way, as Mr. Sawhill apparently did suggest to you yesterday, that we need to wait very long to know which way the country wants to go on rationing.

In saying that we could use citizen rationing boards, I don't mean to rule out the so-called white-market or negotiable-coupon solution. For example, you could have rationing boards that give extra coupons to some individuals or groups, and such extra coupons could be nontransferrable red coupons, while the negotiable ones could appropriately be green coupons. I would rather call it a green market than a white market, by the way, to avoid individious comparisons.

To bulwark the rationing system, an increase of perhaps 10 cents a gallon in the gasoline tax would also make good sense. Not only would it help cut consumption, but it would yield perhaps $8 billion a year that could be utilized in part for "Project Independence," in part for mass transit, and in part for support of payments and programs for lower income groups.

Finally, let me list some other policy considerations and recommendations that bear on the energy shortage and the minimizing of its adverse impact on the economy. This is merely illustrative, without any attempt to be comprehensive.

For example, we ought to use the levels of price controls and the authority granted by the Export Administration Act of 1969 to break very serious specific bottlenecks like drilling pipe and tubular casing that is required for domestic oil exploration.

For the somewhat longer run, income tax subsidies for the oil and gas industries need to be changed in at least two ways:

First, by requiring that funds freed by percentage tax depletion be plowed into capital investment in the domestic—or at least North American—oil industry.

Second, mineral depletion allowances and tax credits for royalties on Middle East ventures, perhaps on all overseas ventures, should be ended.

Further, we ought to question the hitherto unquestioned right of the Pentagon to commandeer all the oil it needs for military use, or all the oil it wants.

The production of enriched uranium should be cut back in order to place at the disposal of other consumers as much as possible of the 3 percent of total U.S. electricity consumption that is used in this process.

We need to develop a more rational policy of leasing our own vast public resources of oil and gas, especially on the Continental Shelf, by reducing the front-end risks involved in the present licensing system, and providing for a sizable Government share via royalties of perhaps 50, 60 percent, maybe even two-thirds, in the oil and gas proceeds from operations on public lands or water.

The pricing structure for natural gas should be changed by adjusting the ceilings on existing sources of supply, and removing them on new sources, at least on private lands, and by boosting rates to commercial and industry users.

Electricity rates need to be recast so as to remove price incentives for heavy use.

In other words, we should be using the price and profit and tax incentives, in addition to rationing, in a carefully guided way to protect the public and achieve national objectives.

In conclusion I would say that we should have a policy of, don't just stand there, do something. And I am hoping that Mr. Simon's office will be doing that, and doing it decisively.

The people are again way ahead of the White House—this 71–21 ratio for rationing suggests that—just as they were way ahead in 1971 on the wage-price freeze. I think that they need and want rationing to tell them in an evenhanded way exactly what is expected of them to help thwart the Arabian oil blackmail and keep the U.S. economy running. Every additional day of unlimited gasoline use is stolen from our supplies in February, March, and April. And we are piling up energy I O U's that can only be paid in less jobs and less output when our present supplies, when our inadequate supplies run short. To protect our comforts and conveniences, we are sacrificing jobs and income. It is hard to imagine a worse economic tradeoff for the American people.

Thank you.

[The prepared statement of Mr. Heller follows:]

PREPARED STATEMENT OF WALTER W. HELLER

ENERGY, THE ECONOMY, AND POLICY

Once again, in today's energy crisis, the U.S. is learning the costly lesson that we can't manage economic policy as if there were no tomorrow. But we seem to be slow learners. Witness the economic crises of the 70's that have caught the country and the White House by surprise—and have been met by belated and reluctant, yet drastic, steps that the White House had stoutly maintained it had no intention of taking:

In 1970–71, as this Committee knows all too well (and, indeed, foretold), the hemorrhaging outflow of U.S. funds finally forced the White House to end dollar convertibility and devalue the dollar.

Also in 1970–71, stubborn, self-propelling inflation finally led to the shock therapy of wage-price freezes and phases.

In 1972–73, the startling shift from surplus to shortages in U.S. agriculture and the ensuing food price explosion finally led to removal of acreage limits and most import quotas and price supports.

And, now, the growing energy shortage, underscored by the Arab oil cutoff and the explosion in oil prices, has already led to oil allocations and will, perforce, lead to more drastic measures like rationing and/or stiff gasoline tax increases.

Since the energy crisis abounds in unknowns and unknowables, in economic uncertainties and political indecision, one cannot proceed to an understandable economic appraisal without specifying certain critical assumptions.

UNDERLYING ASSUMPTIONS

Let me start with one central proposition for the longer run. In spite of Mr. Nixon's complacent assurances that the energy crisis is only "a temporary problem," and that "we will once again have those plentiful supplies of inexpensive energy," the Arab oil problem is here to stay. It is having essentially irreversible effects on U.S. energy prices and supply strategy.

First, the era of cheap oil and gasoline is rapidly slipping into history, never to return. The debate over whether we should cut gasoline use by higher prices, by higher taxes, or by rationing may have obscured the fact that petroleum prices are exploding all around us. Look at the facts:

Foreign crude oil: Persian Gulf oil (medium grade) has jumped from $2.50 a barrel earlier this year to $4.90 today. Higher-grade Libyan oil is up from $3.78 to $8.93, Venezuelan from $3.25 to $5.20. Canada is charging a $1.90-per-baller exist tax. Iran got $17.40 yesterday.

Domestic crude: Protected by import quotas, U.S. crude drifted upward from $3.00 in 1970 to $3.40 a year ago to $4.17 today for "old" oil and uncontrolled prices on "new" oil (as much as $2 or $3 higher, more on tie-in sales).

Last week, White House sources characterized the decontrol of "old" oil prices as "not a matter of it, but when."

Wholesale prices of all fuels are 40% above a year ago, having risen 19% in November. Refined petroleum products are up 90%, with 35% of that jump occurring last month.

Meanwhile, down at the pump, the "low-test" gasoline I could buy in the Twin Cities last summer at prices ranging from 28¢ a gallon at the cut-rates of 33¢ at the majors has jumped to 44¢ wherever I turn. In the same area, No. 2 heating oil is up from 19¢ last year to a range of 23¢ to 30¢ last week. Retail prices of all petroleum products seem headed for another 25% rise in the coming year.

In short, price changes that will have major effects on the rate of inflation and on patterns of both consumption and production are already in place or are in the pipeline.

Second, in spite of Sheik Yamani's assurances that, once Israel withdraws to its pre-1967 borders, Saudi Arabia and its Arab oil cohorts would never again have any reason to embargo oil exports to the United States, we would be well-advised never again to treat Arab oil exports to us as anything but "interruptible service" energy. Even if the oil valves are not turned on and off for political reasons, we should never forget that the OPEC oil-ogopoly will henceforth manipulate its oil outflow—both up and down—to suit its profit and portfolio objectives. When they want some more dollar assets, the valves will open. When oil in the ground looks relatively more attractive as a portfolio asset, the flow will be choked back or shut off.

It follows that our determination to develop alternative domestic sources of energy supply and cut wasteful uses and nonessential demand must not succumb to the euphoria of an eventual resumption of Arab oil flows. A credible and decisive commitment to develop our own fossil fuel capabilities and push ahead on more exotic energy sources will serve both our economic interests and those of our Arab-oil-dependent friends. Both our bargaining position on prices and our balance of payments will benefit—only yesterday, it seems, we were worried about meeting an annual import bill of $20 billion for Mideast oil a few years hence. And our efforts to cut energy use and expand supply will pay off for Europe, Japan; and others in the form of (a) a more assured flow of Arabian oil and (b) prices no longer supported by an unquenchable U.S. thirst for that same oil.

So I start with the basic assumption that high prices of energy are here to stay and that we cannot afford to turn off the drive for potential self-sufficiency when OPEC turns on the valves again. In addition, any appraisal of the effective energy shortages on near-term economic outlook is highly sensitive to such unknown or uncertain factors as the following:

The true size of the oil and energy shortfall: My working assumption is that the shortfall will be about 3¼ million barrels a day in 1974, consisting of a supply cutback of 2 million barrels coupled with a normal growth of 1¼ million barrels. No significant ready reserves to narrow this gap are available in the form of either stockpiles or unutilized domestic gas and oil productive capacity. And significant obstacles appear to bar the path to early relief from either the potential output of 300,000 barrels a day from the Elk Hill Naval reserves or the quick expansion of coal production as fuel for power plants that was supposed to save 400,000 barrels of oil a day.

The duration of the Arab oil cutoff: For the sake of simplicity, I will assume (a) that the embargo will not be lifted in time to affetc the 1974 outlook very much and (b) that when it is lifted oil prices will remain high and we will not give up our energy-saving and supply-stimulating measures.

The course of national energy policy: Under the whiplash of economic crisis and political necessity, I expect timid and vacillating White House policy to be galvanized into decisive action soon to curb wasteful and nonessential energy use as to protect and restore jobs and output.

The responsiveness of consumers and industry to government appeals and regulations on cutbacks of wasteful and nonessential energy uses: Here my assumption is one of reasonable optimism.

The capacity of industry to adapt to high costs and short supplies of oil by switching to coal, by more intensive labor use, by substituting one raw material or component for another, and by eliminating sheer waste (which E. I. duPont de Nemours and Company estimates at 15% of the power used in industrial processes, a potential saving of more than 1.5

million barrels of oil a day): After some hesitation and delay, I anticipate important savings on this front.

The short-run price elasticities of demand for gasoline and other petroleum products: Studies by Data Resources, Inc. and others place this at a little more than 0.2 for gasoline and a little less for other oil products. In other words, a boost in gasoline prices from 40¢ to 50¢ a gallon, or 25%, should cut gasoline consumption by 5% to 6%.

IMPACT ON THE ECONOMY

In examining the impact of the energy crunch on the level of economic activity, one can usefully distinguish among several categories of negative effects on GNP through:

cutbacks in consumer demand for things complementary to gasoline and other petroleum products (autos, tires, campers, motel services, meals away from home, and so on) not offset by shifts of consumer spending to other goods and services;

the direct loss of output growing out of reduced oil imports and the associated loss of value-added as a result of the slowdown in oil refining, distribution, and the like;

cutbacks in supply caused by bottlenecks in transportation, plant and office closings, and shortages of petroleum feedstocks for the petrochemical industry;

temporary cutbacks in plant and equipment investment decisions because of hesitation, uncertainty, and the process of shifting to less energy-intensive production.

By far the largest jolt to the economy will come from the demand side. A distinctly tentative assessment suggests a direct cut in consumer demand for things complementary to gasoline of nearly $15 billion at an annual rate during 1974. Some $7 to $8 billion of this drop would be in automobiles, brought about by a slump in unit sales to a range of 8 to 9 million (including 1½ to 2 million imports) and a decided shift to small cars. Other demand complements associated with autos would account for much of the balance.

Although there would be sizable shifts in demand to other areas (one thinks of TV sets and other forms of home entertainment, coal, clothing, and the like), there will be a period of confusion, anxiety, and hesitation that will lead to a higher rate of saving. Substitution of other forms of consumption is likely for small-ticket items and services, but there is likely to be far less substitution in the case of big-ticket, credit-financed items like autos, trucks, and campers. Taking these factors into account, one can project a net cutback of consumer demand to the tune of $8 to $10 billion during 1974 as a reasonable first approximation.

Hesitation and readaptation of investment plans might cut $1 to $2 billion from business fixed investment in 1974. One could also visualize a loss of value-added in the petroleum industry of perhaps $3 billion.

What about the energy-related supply bottlenecks and output interruptions which loom so large in the news accounts of the economics of the energy crisis? During the period when policy is still floundering in its attempt to sort out essential from nonessential uses of energy, such supply interruptions and dislocations will indeed be disturbing. But the more we force the cutback in energy use onto nonessential automobile use, space heating, and industrial waste, the less will be the impact on supply. For 1974 as a whole, most qualified observers are beginning to conclude that supply disruptions induced by the oil shortage will have only a minor effect on GNP.

Adding up these direct negative effects and taking account of the induced effects through the dynamic multiplier process, one arrives at a cutback of $25 to $30 billion, or just over 2%, in 1974 GNP owing to the energy shortage. Since this markdown will be imposed on an economy that was previously expected to show a 2% to 2½% rate of advance for the year, the energy-adjusted projection represents essentially a no-growth situation for 1974.

Although the size of GNP losses attributable to the oil shortage are difficult to pinpoint, the time pattern of GNP advances during 1974 seems reasonably clear. After a winter of severe economic discontent, any reasonable and rigorous set of energy and stabilization policy responses should lead to a summer and fall of rising spirits and rising GNP.

The first half of 1974 will look like—and perhaps by traditional standards will be—a recession. We can expect a drop in real GNP at an annual rate of about

1½% in the first quarter and 1% in the second, followed by a moderate rise in the third quarter and a more rapid recovery in the fourth.

During the next several months, the economy will suffer from temporary paralysis of business and consumer spending decisions in the face of extreme uncertainty, spot shortages, regional imbalances, and stock market and other anxieties. Perhaps half of the cutback in consumer spending on petroleum complements will find its way into savings early in the year. Later on, as consumer (and producer) ingenuity expresses itself and confidence grows, the substitution of other spending will steadily rise from the initial 50% level. The processes of economic adaptation and of suppression of nonessential oil uses should be far enough along by mid-1974 to permit expansion to resume in the second half of 1974. As the readjustment of consumer spending continues and as investment grows in the process of redirecting production toward energy-conserving production processes and buildings, compact cars, larger coal output, and so on, economic recovery should be moving strongly in 1975.

Given the foregoing projection of economic consequences of the oil shortages, one can expect a material worsening of inflation. As a function of the direct effects of petroleum price boosts and adverse effects on productivity—not to mention such ominous portents on the labor front as the reopening of the Teamsters contracts—one can expect an add-on of 1 to 2 percentage points to the advance in the cost of living for 1974.

In other words, a rise of 7% to 8% in the first half of the year and perhaps 6% in the second now seem in the cards. A rise of 5% to 6% in the GNP deflator during 1974 can also be expected.

Accompanying the drop in output will be a large and distressing jump in unemployment. It is likely to rise above 6% by the second half of the year.

POLICY IMPLICATIONS

Let me address myself first to the stabilization policy implications of the foregoing economic scenario, with particular emphasis on monetary policy.

I anticipate that the prospective jump in the rate of inflation triggered by the energy shortage, coupled with a big spurt in money supply in November (at about a 10% annual rate), will lead some observers to call on the Federal Reserve to keep its foot firmly on the monetary brake, primarily by cutting back the growth in money supply. But under present circumstances, such counsel would be misguided:

The big spurt of money supply in November was mainly the result of a big jump in "precautionary demand" for money as a result of consumer and business indecision and anxiety—as such, it is distinctly a false signal for cutting back the growth in money supply.

Nor should the extra price jolt from the oil shortage in 1974 be taken as a signal—any more than the 25% jump in food prices in 1973—for monetary tightening. These shortages, to use the words of Arthur Burns in his recent defense of monetary policy, "hardly represent either the basic trend in prices or the response of prices to previous monetary or fiscal policies." To attempt to hammer down price increases in food and oil—two sectors with flexible prices and inelastic demands—by restrictive monetary policy would wreak havoc on the rest of the economy.

Since an easier money stance was already in order before the cutoff of Persian Gulf oil, and since the major impact of that cutoff on GNP will come through discouragement of consumer spending, the Federal Reserve should definitely move in the direction of ease.

In so moving, it should use interest rates as its guide under present circumstances. The Board should stop worrying about the demand-oriented increase in the money supply and concentrate on bringing short-term interest rates down to soften the impact of the energy shortage superimposed on an economic slowdown that was already in process.

Following its initial move last week in cutting reserve requirements on Certificates of Deposit, the Federal Reserve should strive to bring the Federal Funds rate down from its unduly high level of 10%-plus.

In the field of fiscal policy, explicit steps are even more difficult to specify, but the general directions seem clear enough. The startling upsurge first in food and then in fuel prices (not to mention clothing) has been sharply regressive. Although food represents just above 20% of overage consumer spending, this rises to 40% and 50% in the very low income groups. For the poor family that

spends 40% of its disposable income on food, the 20% to 25% leap of food prices in 1973 represents a cut of 8% to 10% in real income. If we add to that a 2% to 3% cut via surging energy prices, the implication is clear: anything we do on the fiscal front in 1974 must, as a matter of equity, transfer funds to the lower income groups.

The case for tilting fiscal policy in this direction is reinforced by a consideration of the pattern of energy demand across income groups. It seems fair to postulate a high income elasticity of demand for nonessential energy. To put it more simply, the larger the family income, the larger proportion that is likely to go for uses of energy that society would regard as nonessential or downright wasteful.

This does give us some clues to fiscal measures that might be appropriate. Especially to the extent that we increase excise taxes to curb gasoline use, we should make restitution to lower income groups via cutbacks in social security and income tax withholding and cash refunds to the poverty groups not covered by such withholding. Still within the framework of any energy tax, one should also consider providing free bus service or other commuter transportation for the lowest income groups.

But I do not mean to say that one has to stay within the framework to carry out the appropriate distributive objectives. In a period when events have cut deeply into the real incomes of poor families and when a great many unskilled and lower income persons will be thrown out of work as a result of the energy crunch, it would make good economic and humanitarian sense to restore some of the cuts in social service budgets, expand the public employment program, and eliminate payroll taxes on persons below the poverty line.

Turning to the energy field itself, I do not mean to imply by the above that I would rely on the price mechanism, aided and abetted by tax hikes, to ration gasoline and effect the 25% to 30% cut that is vital to preserve the supply of petroleum required to sustain employment and output. Nor will the "do-it-yourself" or "catch-as-catch-can" system of rationing implied by the present system of allocations combined with a squeezing down of refinery output of gasoline do an acceptable job. It can only lead to long queues and mad scrambles at the gasoline pumps, grey-market payola, corrosive favoritism, tie-in sales, and sweetheart deals at the service station not to mention unwarranted profits.

For all its blemishes and administrative difficulties, an outright system of consumer rationing remains the fairest, quickest, and by a large margin (a 71–72% margin in the Harris Poll as against a 78—17% vote *against* higher taxes), most acceptable way to go.

The choice of a particular form of rationing should be made on the basis of (a) equity in distributing reduced gasoline supplies, (b) minimizing black markets and counterfeiting, and (c) speed of putting the plan into effect. A system using negotiable ration coupons (distributed on a per-car or per-licensed driver basis) or a basic ration plus high-premium coupons sold by the government could be quickly and simply put into effect. Or one could use citizen rationing boards as in World War II, except that everyone granted a special ration would get non-transferable stamps, say, red stamps, while the negotiable ones could appropriately be green. Once the rationing system were in effect, people would be free to use their ration as they pleased—without a detailed set of curbs on speed, car mileage, Sunday use, and so on. Somewhat paradoxically then, rationing—especially if administered through the use of negotiable ration coupons—can be thought of as a way of preserving freedom of consumer choice.

To bulwark the rationing system, an increase of perhaps 10¢ a gallon in the gasoline tax would make good sense. Not only would it help cut consumption, but it would yield perhaps $8 billion a year that could be utilized in part for energy research and development, in part for mass transit, and in part for support of payments and programs for lower income groups.

Finally, in summary form, let me list some other policy considerations and recommendations that bear on the alleviation of the energy shortage and the minimizing of its adverse impacts on the economy:

Using the levers of price controls and the authority granted by the Export Administration Act of 1969, the Administration should act to break specific bottlenecks like that in drilling pipe and tubular casing required for domestic oil exploration.

The hitherto unquestioned right of the Pentagon to commandeer oil for military use should be subjected to intense questioning, and its plans for military conservation of energl should be subjected to rigorous review by the new Federal Energy Administration.

The production of enriched uranium should be cut back in order to place at the disposal of other consumers as much as possible of the 3% of total U.S. electricity consumption that is used in this process.

Income tax subsidies for the oil and gas industries need to be changed in at least two ways, first, by requiring that funds freed by percentage tax depletion and related tax preferences be plowed into capital investment in the domestic oil industry and, second, that mineral depletion allowances and tax credits for royalties on Middle East ventures (perhaps on all overseas ventures) be ended.

We need to develop a more rational policy of leasing our own vast public resources of oil and gas (especially on the continental shelf) by reducing the front-end risks involved in the present leasing system and by providing for a sizable government share (perhaps 50% to 60%) in the oil and gas proceeds from operations on public lands or water.

The pricing structure for natural gas should be changed, first, by boosting rates to commercial and industrial users, second, by adjusting the ceilings on existing sources of supply and, third, by removing them on new sources (at least on private lands).

On electricity rates, we need to recognize that, in a global sense, electricity is an increasing-cost good. This calls for an end to quantity discounts and, indeed, rising rates on excessive consumption.

In other words, we should be using price, profit, and tax incentives in a carefully guided way to protect the public and achieve national objectives.

As a final point, let me simply quote from a *Business Week* editorial of December 8: "A multi-pronged approach to the energy problem is probably the right one. What the public needs to know is just what the prongs will be and how sharp. The unnerving thing about the present situation is the suspicion that the U.S. is blundering ahead with no real energy plan—simply hoping for the best."

Chairman REUSS. Bravo and right on! Thank you, Mr. Heller. Please proceed, Mr. Meyer.

STATEMENT OF JOHN R. MEYER, 1907 PROFESSOR IN TRANSPORTATION, LOGISTICS, AND DISTRIBUTION, HARVARD UNIVERSITY [1]

Mr. MEYER. Let me first of all state that I am not exactly answering the question you posed to determine the economic impact of petroleum shortages. I sat down and thought about that for a moment, and I decided it is very difficult to figure out what the economic impact would be on the transportation industry until I knew what the public policies would be.

Chairman REUSS. So what you have in your statement is that it is going to be considerable, and we had better do something about it, and you will make some proposal on what we have got to do——

Mr. MEYER. Yes. And it also permits us to be more positive and address the question of what we can do, how we can use this shortage to make some long overdue adjustments in our policies and our lifestyles that probably would be beneficial in the long run.

I take it it doesn't take much calibration to justify why one wants to look at transportation when discussing energy.

Transportation accounts for almost one-quarter of total U.S. energy consumption and roughly one-half of total petroleum usage. In the circumstances, it is hardly surprising, perhaps inevitable, that various

[1] The views expressed herein are strictly those of Mr. Meyer and in no way reflect any policy conclusions or advocacies of any organizations with which he is associated.

"transportation solutions" to today's energy shortages should be sought.

Clearly, though, various proferred methods to conserve on transport use of energy vary widely in potential effectiveness and other important respects as well. For example, some are more consistent with the achievement of full employment than others. Some tend to be rather more regressive in their incidence by income groups. Some are more consistent than others with achieving a longer run equilibrium in energy supply and demand—an equilibrium which probably will be at energy price levels 50 percent or more higher than when all this started.

Policy decisions, moreover, seem to be imminently needed. Unfortunately, our knowledge is not as precise and quantitative as it should be about the energy consequences of various transport policies. The time, though, has probably come to at least list what little we do know about the different characteristics of different transportation solutions to energy problems. The remainder of my remarks will be largely devoted to such an effort, proceeding through a "catalog" of different transport solutions—some widely discussed, some not so publicly acknowledged.

(1) EXPAND RAIL TRANSIT

As a solution to the immediate energy shortage, expansion of rail transit is simply a nonstarter. New rail transit systems usually require approximately a decade to plan, finance, and build; substantial additions to existing systems require only a bit less. Furthermore, rail transit sytems are expensive and usually require a good deal of energy for their construction. And even if we could wave a magic wand and immediately create several new systems overnight, it is not at all clear that this would immediately reduce total energy demand. Past experiences with new transit systems or extensions in North America strongly suggest that a very large percentage of total patronage usually comes from previously existing public transit, usually buses or streetcars. The net propulsive efficiency of a reasonably well-loaded bus is not too much different or less than that of rail transit. Moreover, it is usually somewhat easier to schedule buses so as to minimize "deadheading" or so-called empty backhauls than it is for rail systems. Also, rail systems tend to be less ubiquitous, especially in their residential coverage, and the number of stops that can be efficiently made with a rail transit system are usually less than for bus, so that with supplantation of bus by rail transit, some slight increase may occur in the number of car miles driven to get to and from public transit facilities. Indeed, if a rail transit system eliminates enough bus competition and that bus competition has a more ubiquitous route-structure and more stops, the net effect of developing rail transit might be some slight reduction in total transit patronage.

(2) EXPAND EXISTING COMMUTER RAIL SERVICES

Adding cars and trains to existing commuter rail systems would probably help, but only marginally. The reason, simply, is that rail commutation accounts for a very small percentage of total commutation in the United States, less than 1 percent. Accordingly, even a 50 percent increase in such rail commutation would make only a small

contribution to the solution of the total energy problem. A massive increase in total rail commuter services, moreover, would be very difficult to effectuate, mainly because most such facilities are nearly fully utilized now during the crucial peak commuter hours. However, some small help might be garnered from expanding existing rail commuter services and these could prove particularly useful during the off-peak hours when more unutilized capacity is likely to be available.

(3) EXPAND EXISTING RAIL TRANSIT SERVICES

Much the same comments apply as to the expansion of rail commuter services. The potential, though, is somewhat greater: about 2.5 percent of total commutation is by subway or elevated trains. However, the peak hour capacity constraint is perhaps even more binding for public subway or elevated services than for suburban rail commuter services. Moreover, electric propulsion is deemed by many engineers not to be as energy efficient as more direct, self-contained systems. Again, though, expansion of off-peak use—for example, through reduced or promotional fares—could prove useful.

(4) EXPAND TRANSIT BUS SERVICES

The sensible way to do this would be to set aside for exclusive or priority bus use more of our existing urban streets and, more importantly, urban high-performance expressways. The Shirley Highway experiment and the special bus lanes on several of the tunnels feeding into Manhattan are examples of what can be done. The objective would be to make bus service more attractive than auto commutation by increasing bus speeds relative to auto. Evidence suggests that public transit patronage is more sensitive to service differentials than to price incentives. To the extent that bus vehicles are available and at least some spare capacity would appear to be available, highway-priority express bus systems can be implemented rather quickly. Indeed, the very act of improving bus performance speeds during rush hours would augment effective capacity when most needed. Furthermore, unlike expanded rail commuter or rail transit service, the possibility is not limited to just a few American cities, but could be implemented virtually everywhere. Besides the limitation on available buses, the major difficulty in implementing widespread experimentation with express bus services would be the generally desperate or impoverished financial state of most public and private transit systems in the United States today. Most local transit companies or systems are in no position—or mood—to undertake any large-scale risks, including experimentation with express services. Moreover, some delicate problems will be encountered in coordinating the many different public and private agencies involved, ranging from Federal and State highway authorities to public regulatory commissions to transport workers' unions to State and local franchising bodies. Nevertheless, a relatively modest infusion of money for such bus services, say up to one-half billlion dollars annually might make quite an impact. Certainly, the Urban Mass Transit Administration—UMTA—of the Department of Transportation might give such projects priority consideration.

(5) IMPROVE TRAFFIC CONTROLS ON MAJOR URBAN EXPRESSWAYS

It is perfectly obvious that cars or trucks or buses when standing still in traffic congestion continue to idle their engines and therefore are wasting fuel. The truth is, moreover, that congestion of a highway usually reduces the highway's effective carrying capacity. As a traffic engineer once described it: "A high-performance urban highway is very much like a toilet; it works perfectly well as long as you don't try to put too much through it at one time." Accordingly, we can effectively increase both our highway capacity and fuel efficiency by controlling access to high-performance highways to prevent their total coagulation during rush hours. As an overall fuel-saving strategy, however, such devices may not work, unless augmented by other policies. Specifically, if the speed and effective capacity of urban expressways are improved, more auto travel may be induced; moreover, average speed almost certainly will go up so that the "cruising speed" fuel economy of vehicles may be somewhat lessened. Accordingly, an urban traffic management strategy for conserving fuel probably would work best if augmented by set-asides of urban expressways for exclusive or priority use by buses or by direct gasoline rationing or some other measure that would reduce overall travel demands.

(6) COMMUTER CARPOOLING

This is a potentially most efficacious policy since the net propulsive efficiency of a fully loaded automobile, particularly a compact, or subcompact, is remarkably high—and only marginally worse than that of much public transit—while the propulsive efficiency of a standard sized U.S. car with one person in it is rather low. It has been estimated that an increase of one in the number of passengers in every commuting auto would save almost 800,000 barrels a day of gasoline in the United States! The difficulty, of course, is getting people to do the pooling. Pooling means adjusting individual schedules, extra time for picking up and terminating, and abandoning some of the seeming preference of Americans for privacy. The mechanics of actually matching people by origins and destinations to facilitate carpooling is not terribly complex in this computer age. In all likelihood, however, it will require a substantial increase in gasoline prices or actual gas rationing to provide the requisite incentives. Carpooling is not, moreover, necessarily pure gain: the unpooled commuter car may be used more for shopping stops and delivering or picking up other members of a family at schools and other destinations. Cars would also be more available at home during the day so that use for noncommuting purposes would increase. On balance, however, carpooling if implementable, could save fuel and quickly.

(7) USE SMALLER AUTOMOBILES

Without much question, the use of smaller automobiles would be one of the simplest and least disruptive ways to reduce total U.S. energy consumption. Roughly 30 percent of total petroleum used in the United States now goes to propelling automobiles. Accordingly, even a small economy in this sector can add up to a substantial total. It has been estimated, for example, that if the average U.S. car weighed

2,500 pounds instead of 3,500 pounds the United States would save a little over 2 million barrels of crude daily or just under 12 percent of total consumption today.

Besides conserving fuel, the use of smaller cars should also help reduce air pollution—and perhaps especially the costs of reducing auto contributions to such pollution—downtown street congestion and the costs of building and maintaining parking facilities. In fact, one of the few negative aspects of smaller cars might be that by reducing congestion and auto operating costs, they might increase total miles traveled by car, thereby offsetting some potential fuel economies. The public policy question with regard to small cars would seem to be whether any special or additional inducements are needed to expedite the move. Clearly, higher fuel prices, let alone the threat of actual gasoline rationing, are already having an impact on American automobile tastes. A weight- or horsepower-related Federal tax on automobiles might accelerate the trend. As a means of meeting the immediate energy shortage, however, the small car solution is obviously limited: it may take 8 to 10 years to turn over or renew the American automobile fleet. In the short run, the most that could be expected would be that higher gasoline prices, taxes, or direct rationing of gas might induce somewhat greater use of smaller cars in two-car families and some acceleration of the rate at which people would purchase small cars instead of larger cars—though the constraint on small car buying now appears to be more on the supply than demand side.

(8) ELIMINATE INEFFICIENCY IN COMMERCIAL AIRLINE OPERATIONS

The usual suggestion is to permit cartelization on major intercity airline route segments so as to achieve a controlled reduction in the amount of competition on such segments and a concomitant increase in load factors. Needless to say, such cartelization has some obvious profit attractions for the airline companies; not surprisingly, therefore, this particular fuel saving strategy has been one of the easiest to implement. It would appear that 100,000 barrels a day of aviation jet fuel, or distillates, can be, or perhaps already are, being saved by these cartel agreements. Another 100,000 or so daily barrels can perhaps be squeezed out by similar devices being used to reduce flights during the winter doldrums. The next obvious step, at least from an efficiency standpoint, would be to reduce commercial airline service to many small towns where the traffic generated is hardly sufficient to sustain commercial operations. The difficulty is political unpopularity, particularly in the small towns where service is dropped. Nevertheless, in many instances not much would be lost in terms of the quality of service rendered, particularly if increases in air services occurred at nearby "regional consolidation points" or if good alternative bus service were available. However, the volume of fuel involved is probably not all that great and if gasoline rationing induces a massive reduction in private transport alternatives, then some increase in demand for public transportation might ensue and the economics of some marginal points might also improve.

Another possibility for improving airline efficiency would be to open up more international gateways so as to reduce the amount of discontinuity now often introduced into international travel by the necessity

of traveling to New York, Los Angeles, or other major international gateway cities. Again, though, the amount of fuel to be saved is probably trivial and not worth the administrative effort.

(9) EXPAND INTERCITY RAIL PASSENGER SERVICE

This policy encounters supply constraints similar to those hamstringing expansion of suburban commuter or public transit rail services. To begin, much of the rail roadbed is really not in proper condition to sustain high-speed intercity rail passenger service today. Moreover, there is a certain irony in cutting back on today's dominant mode of intercity public passenger travel, the commercial airlines, and at the same time expanding an alternative mode. Of course, the substitution might make sense if the propulsive efficiency of rail was a great deal higher than that of the airlines. Apparently, rail intercity passenger service does have a higher fuel efficiency than intercity commercial airlines if very dense corridor volumes are involved; that is, the train is a very efficient mode, at least in terms of fuel consumption, if 500 to 800 or more people can be moved in one train. At lesser volumes, which are characteristic of the vast majority of U.S. intercity links, the bus or the airplane operate more efficiently; that is, in units of 50 to 450 or so passengers. In short, the potentialities of gaining any substantial fuel economy through expanded rail service are almost certainly limited to a few of the very high volume passenger corridors in the United States, the Northeast corridor being the most prominent and perhaps the only realistic example.

(10) EXPAND INTERCITY BUS SERVICE

If the demand is there, this is probably a desirable adjustment. A loaded bus is quite economical in terms of the amount of fuel required per passenger mile of travel. As long as fuel supplies are made available, moreover, bus service will almost surely expand automatically to meet any increase in demand. The moral, thus, is to insure that the fuel is available.

(11) SUBSTITUTE RAIL FOR TRUCKS ON LONGER DISTANCE INTERCITY FREIGHT HAULS

The usual initial observation on this possibility is that railroads only require about one-fourth to one-third as much fuel per ton-mile of freight carried as a truck. This observation, however, is probably strictly true only as it applies to the so-called line haul portion of the trip. While it is difficult to quantify or to document the case, much of the line-haul efficiency of the railroad may be lost in greater fuel consumption being required to terminate or originate rail shipments, particularly manufactured goods coming from or going to small towns or more remote industrial sites not located on rail main lines. "Containerized" or "piggyback" shipment of such goods normally would be the most efficient, both in total costs and fuel requirements. Containerization or piggybacking, in fact, would be a good long run approach to most long-distance shipment of manufactured products; in essence, such a move would specialize railroads and trucking in what they best do.

In the short run, however, capacity constraints will limit any shift in this direction. Furthermore, with a fuel shortage and fuel costs rising, truck costs, and therefore truck rates, should rise more rapidly than for the railroads—and perhaps sufficiently to keep railroad capacity and capabilities fully occupied over the next few months. If some further incentives were deemed desirable in the short run, some reduction in ICC regulation could be contemplated. In particular, agricultural and bulk commodity exemptions presently enjoyed by truck and other carriers might be extended to the railroads. Similarly, common carriers might be granted the right to selectively change their tariffs by, say, up to 10 percent annually without first obtaining ICC permission. Among other advantages, greater freedom in ratemaking would aid the carriers in adjusting to higher fuel costs. And in the long run, more ratemaking freedom would be desirable under any circumstances, permitting different transport modes to specialize more in what they did best and to adapt better to changing circumstances.

(12) REMOVE OTHER REGULATORY RESTRICTIONS OF TRANSPORT

Possibilities exist for immediately reducing the total number of miles trucks must travel in order to move their traffic by lifting certain existing ICC and other regulatory restrictions on truck route selection. Such a step would also improve the long-run efficiency of the transportation system. Similarly, if some of the present restrictions on contract and private carriage trucking were removed, these truckers could fill up more of their backhauls. The same holds true for the "mixing rules" that limit the efficiency of some barge operations.

In general, most existing ICC regulations on surface freight transport are invitations to inefficiency. Overall, economists suspects that $4 billion to $10 billion a year might be saved by simply eliminating most of these regulations. A substantial fraction of this total saving, moreover, almost surely would represent reduced fuel use; at a minimum, rationalization of surface freight—including diverting some traffic from truck to rail—could save 100,000 barrels of fuel a day. And such savings would also make a modest contribution to reducing inflationary pressures in our economy.

This catalog of transport solutions to the energy problem has been somewhat rambling and discursive. In extenuation, I would point out that transport changes usually involve fairly difficult systems evaluations in which the secondary and tertiary effects of any policy move are not always obvious, and may often counterbalance or undo the initial of primary effects.

Nevertheless, we can identify some policy priorities. Specifically, the transportation policies most likely to help with the immediate fuel shortage would appear to be as follows:

(1) Emphasize UMTA policies for the next 2 years or so that develop high-performance express bus services in and around American cities; if this requires some slowdown in the development of future rail transit, so be it; indeed a crash program to develop express bus services might well be in order, consideration should also be given to policies that stimulate—or maintain—lower transit fares, at least for the duration of the energy shortage.

(2) Remove much of the present ICC regulation of intercity surface freight transportation; at least eliminate or reduce the restrictions on truck route selection and extend agricultural and similar bulk commodity exemptions now enjoyed by truck and water carriers to the railroads; similarly, at least an "emergency" 6 months to 1 year exemption might be granted to private and contract carriers on restrictions that now hinder their filling up their empty backhauls; greater freedom should also be given to all common carriers, including the railroads, to modify their rates, say, by 10 percent a year, without waiting for ICC approval.

(3) Be certain that any fuel rationing or allocation scheme does not severely cut back on availability of fuels for the operation of basic freight and public transportation facilities; for example, it is one thing to reap some short run benefits from a reduction in excess intercity air passenger service, but an entirely different matter to allow a fuel shortage to prevent desirable expansions in public transportation of all kinds; similarly, it is inane to use informal rationing by "congestion"—such as the 20-gallon limit per stop now apparently being imposed on many truckers—as a means of reducing total fuel consumption; in general, public transportation can usually be designed to be more efficient in the use of fuel than private transportation and more and better public transport should ease the impact of any cut in the private sector.

(4) Develop and implement traffic metering or flow control programs that would eliminate congestion and tie-ups of major urban expressways but only if accompanied by the express bus development program outlined above or by a reasonably comprehensive nationwide program of gasoline rationing.

Gasoline rationing—by prices, coupons, taxes, or some mix of these—is perhaps a good point on which to conclude. It is reasonably obvious, simply because of the bulk of the volumes involved, that the only way in which substantial cuts can be made in fuel consumption in the transport sector is by reducing the fuel used by private automobiles. Almost 90 percent of intercity passenger travel is by automobile; over 80 percent of the populace commutes, either as drivers or riders, in private automobiles. Accordingly, if really big energy savings are to be sought through so-called transportation solutions, much of that must come from the private automobile. Moreover, since one-third or so of private automobile travel is estimated to be for pleasure driving, the odds are that a substantial reduction can be made in private auto use without too disastrously disrupting the productive efficiency and employment levels of our economy. And that, after all, almost certainly should be the dominant consideration in making these difficult policy choices.

Thank you.

Chairman REUSS. Thank you, Mr. Meyer. You suggest that expanding transit bus service is one of the best, if not the best, short term way of overcoming the effect of fuel shortages on transporation. You particularly suggest that a good way to improve transit bus service is by exclusive buslanes on existing urban highways and expressways. I surely agree; obviously where you have an existing expressway, that is a good place to set aside a separate bus-lane. Where you don't, however, where you have in a given city whatever expressways that have

been built and a few more on the drawing boards, what kind of trade-offs or cost-benefit considerations do you see from the standpoint of public bus services in going ahead and building those extra expressways? How costly is an urban highway in terms of energy, and what are the time completion factors?

Don't you think it is a little of the tail wagging the dog to build an interstate highway through a city, usually ripping down a lot of houses and impinging on parks in the process, in order to provide a lane of that highway for buses?

Mr. MEYER. If I understand the question, I think I would tend to agree. I would point out, though—to revive an old policy suggestion that I made many, many years ago—that perhaps we oftentimes pose these questions the wrong way. All too often it seems to me that new urban expressway extensions in cities are designed in ways to minimize the costs of construction and to maximize the disruption, either by taking housing or by obliterating existing public parks, and so forth and so on. And in recognition of that 10 years or so ago I suggested that what we really should do is earmark a fair proportion—I opened up with $500 million a year—out of the highway trust fund as money that should be administered through the Department of Housing and Urban Development, and made available directly to the mayors for buying more esthetic, more desirable highway solutions in their cities. Note, this doesn't mean the money is taken away from the highway builders—a thing that they complain about—this is simply saying that a portion of the highway trust fund money would be programed through different sources and different people who would be more sensitive and responsive to the housing and public park and tax problems that are created now.

It would increase the total price of building some of our urban highways. But that doesn't disturb me terribly much, if we improve their esthetics and social acceptance. And I would also point out that if we do a very careful count on the revenues generated by urban expressways and their costs—the revenues generated under today's tax formula—we usually find that urban highways pay well. In many States, in fact, it is the gas tax revenues from the urban highways and roads that pay for most of the improvements out in the lower density agricultural areas of the State. So some redistribution of these highway construction costs and funds toward urban areas, in order to make the automobile and the highway a more suitable resident of the urban area, strikes me as highly desirable.

But this, of course, has nothing much to do with our energy problem.

Chairman REUSS. I want to restrict it to the energy problem.

You say, I agree with you, that a good short term—and long term—energy saver is to get people out of individual motor cars and into mass transit, and that the most feasible form of mass transit generally in the next few years is better bus transit service; that isn't very glamorous or romantic, but it can be done——

Mr. MEYER. And it can be done quickly.

Chairman REUSS. And then you say that to make bus transit sensible and not snail like, it is well to provide a separate lane so that the buses don't get caught in the congestion. I think everything so far is fine. And, as you say, use what you have got, existing streets and highways, and if you have got them, interstate highways. All is in accord so far.

Then I ask, however, whether you think there is a strong case for "completing the urban interstate highway program" for this reason? And I gather you tend to say that you look rather skeptically at the urban interstate highway program from here on out, because you can achieve the mass transit benefits in a less expensive and discombobulating way, and for the rest, the private automobile with one person in it driving 380 horsepower is not going to last too long—isn't that about it?

Mr. MEYER. That is essentially what I am saying. The only thing I can add is that I wouldn't want to arbitrarily say that every extension of an interstate highway in an urban area is foolish or not justified for one reason or another. I would want to look at each case on its own merits. I would also like to open up the possibility that some highway funds would be available to the mayors or the local community to mitigate the harmful side effects of some extensions.

Chairman REUSS. Very good. One other question.

In your statement, in talking about intercity rail passenger service, you talk about the comparison between rail intercity passenger service and bus or airplane intercity passenger service, where the density of the corridor in terms of traffic is not very great. And there you say that the rail tends to lose out to the bus or the airplane, at least in units of 50 to 450 or so passengers.

Without quarreling with that conclusion, why is that so? Why can't you run a perfectly good train with 400 passengers in it that beats out the bus, let us say, or the airplane or something else?

Mr. MEYER. This is strictly on fuel economy. Actually the bus and airplane do even better when you bring in labor and capital cost considerations.

The reason is simply, I guess, the physics of it. The railroad gains its greatest efficiency when you string out a lot of cars behind a big engine, so as to limit air resistance. You then begin to get the economies of a large engine and reduced friction of steel on steel, and so forth and so on. The bus and the airline advantage is a fuel response curve with respect to volume that is more linear, more constant. You can achieve most of the economies as far as fuel is concerned in bus operations at around 50 to 75 passengers in one vehicle. On an airplane this is a little tricky. The most modern planes, with the most efficient engines, also happen to be the big ones. We do not have any experience yet with applying the same engine technology that we are now using on the DC–10 and the 747, and the 1011 to smaller planes. But I would guess that you exhaust the fuel economies on the airplane somewhere between 200 and 250 passengers, even below that. You get most of the fuel scale economies out at around 70 to 100 passengers in a plane. It is just in the physics and the design, the engineering characteristics of the different modes.

Chairman REUSS. I do not have any trouble seeing your comparison with the airplane. But as between bus and rail, it would seem to me that the headwinds and the weight and the friction factors are not vastly different. The bus has the friction of rubber tires on the highway.

Mr. MEYER. The tare weight ratio, I suspect, is the easiest way to explain it. Even if you have self-propelled cars, generally you are carrying around more tare weight. The rail vehicle is a lot heavier than the bus. It is very difficult to design any rail passenger car that

carries less than 100 passengers. About the smallest possible unit would be a self-propelled car carrying 90 to 100. And the tare weight, the amount of extra weight that you have to carry for each passenger, the weight of the box, will be larger for that car than it will be in a typical 50- to 60-passenger highway bus.

Another factor would be that the railroad is not quite as ubiquitous in its coverage, and you would probably have a little more circuitry in the route structure than you would have with the bus system.

Chairman REUSS. Senator Proxmire.

Senator PROXMIRE. I am just delighted that I had a chance to come. I apologize for being late. We had a hot and heavy session in Banking this morning with Mr. Casey there. That is the reason I was delayed.

Mr. Heller, there is so much in your statement that is provocative, and a great deal of it I am enthusiastically in favor of, and some I would like to question you about. You have a brandnew elasticity factor that I have not seen before for gasoline, 0.2, with respect to elasticity of demand for gasoline and other petroleum products. And you translate that into a 40 to 50 cents a gallon increase, if gasoline consumption is to be cut by 5 or 6 percent. Now, on the assumption that this price increase will not bring production increases for a while, probably for a year or so, and maybe longer than that, probably longer than that, how high a price would gasoline have to be, in your view, to bring supply and demand into balance if your assumptions on shortages turn out to be the case?

Mr. HELLER. Let me say first of all, that my prepared statement refers to shortrun elasticities. In the longer run, both the supply and the demand elasticities are very considerably larger than in the short run. But I am just taking——

Senator PROXMIRE. The long run is pretty long too, is it not?

Mr. HELLER. The long run is pretty long enough for people to adjust their lifestyles, switch to smaller cars, and so forth. I am assuming that the shortrun response lies somewhere between 0.20 and 0.25. This number comes out of studies by Data Resources, Inc. I checked this out yesterday with several of my colleagues who have studied it more carefully than I, and they felt it to be a reasonable shortrun demand elasticity.

Well, that means that to balance this thing out in the short run by price rises alone if we need to get, say, a 20-percent cutback—and some say we need to get a 30-percent cutback—we have to get a market clearing price up for gasoline in the 70- to 80-cent-per-gallon range. Now, in the longer run——

Senator PROXMIRE. I think it is higher than that. The price would have to be higher. On the basis of your calculations you say here, in order to get a 5-to 6-percent reduction in consumption, you have to have a boost in gasoline prices from 40 to 50 cents.

Mr. HELLER. Yes; and I am taking, say, four times that to bring you up to 80 cents.

Senator PROXMIRE. Increase?

Mr. HELLER. Yes; to 80 cents.

Senator PROXMIRE. And when you add that onto the present price of 40 cents a gallon, then the price of gas would be $1.20 a gallon at the pump, is that right?

Mr. HELLER. Where have I gone wrong? I was starting with a base of 40 cents, which, granted, we are already past. You would about have to double the present price of gasoline.

Senator PROXMIRE. I am misreading it. I see. You should have to double it. And it would go from 40 cents to 80 cents.

Mr. HELLER. That is right. That is short run.

Senator PROXMIRE. I was going to say you would have a revolution if you doubled the price, which you say you would have to do in the short run. We would all be impeached if the price should go up to $1.20.

Mr. HELLER. True. That is why I am for rationing instead of the price solution, because you would be impeached.

Senator PROXMIRE. The fact is that if you accept the Data Resources and this other situation, you are just going to have rationing, that is the plain simple arithmetic of it, is that correct, if the embargo continues?

Mr. HELLER. That is right.

Senator PROXMIRE. There is no escaping it?

Mr. HELLER. I do not see any escape from it in any policy that makes sense in terms of balancing cutbacks in comfort and convenience and our love affair with the car, in favor of preserving jobs and output and income.

Senator PROXMIRE. You say that the administration, you feel, is going to act decisively as the situation becomes more clear. They said that they will not be able to make a decision on rationing until the end of this month, and they say it will be March 1 before this can go into effect. That leaves a very, very bad couple of months. What is going to happen? You are going to have people lined up at filling stations or are you going to let the price go up, or both?

Mr. HELLER. I think that we are doing a good deal of the latter already, of letting the price go up. As I pointed out in my prepared statement, the prices have gone up from an average of about 30 cents in the Twin Cities to something close to 44 or 45 cents. That is on low-test gasoline.

Senator PROXMIRE. Much of that increase was before the embargo.

Mr. HELLER. Some of it. But it has accelerated substantially since the embargo. So we have been doing part of the price bit already, a considerable part.

Senator PROXMIRE. But I am not sure that we really have been, because you do have, theoretically at least, gasoline prices under controls. The companies are only allowed to pass on cost increases. They simply cannot show cost increases of this kind. Profits have gone through the ceiling for the majors. And I am sure that reflects the general situation for the other oil companies. Under these circumstances is there a widespread violation of the law?

Mr. HELLER. I find that very difficult to judge. I am only reporting the facts as I see them. But I do find it surprising that those numbers that I cite in my prepared statement concerning both wholesale and retail prices could have taken place under plan IV price control. Whether it is a violation of the price controls or not I cannot say for sure. But I find it very difficult to reconcile with the price control rules.

Senator PROXMIRE. I thought you gave a very helpful emphasis at the beginning of this on recognizing that the Arab embargo is not the

beginning and end of our problem by any means. This is a long-range problem, and if the embargo should end tomorrow we still have a very, very serious problem, and we have to find out how to cope with it. I think you have been reminded of that by the enormous increase recently announced in prices, per barrel prices by the producing countries, especially just yesterday, when we had a price of $16 a barrel for the roughest kind of crude.

Now, in your view, if the embargo should end, would that mean an end in rationing? Should we forget then about rationing, and should we use other means in your view, to bring supply and demand into balance?

Mr. HELLER. Well, I do not think the end of the embargo would immediately trigger an end in rationing. First of all, there is a long delay in the process—not a long delay, a delay of several months—of getting the gasoline into the marketplace again. And second, I do not think that the kind of adjustments that we have to make for the longer run are going to be achieved all that quickly. The very fact that we need to make these adjustments for the longer run suggests that it may be a while after the oil embargo is lifted before we could quit rationing.

Senator PROXMIRE. I am talking about consumer rationing that we do not have now. You are saying that if the Arab embargo should end shortly, we might still have to have temporary rationing until we could adjust to getting those imports here and making them effective.

Mr. HELLER. Not only that, but to give us time to do other things that would help shift from nonessential to essential uses, and to take some of the measures that industry can take to cut back wasteful uses of oil. You notice that the E. I. du Pont de Nemours study said 15 percent of the oil that is used for power in industry is really basically wasted, and that we can save that.

Senator PROXMIRE. Think of the weak psychological position we are in. If the embargo ends is that not kind of a signal for the consumers, individuals and business, to feel that we can relax, and the prospects of voluntary conservation and of eliminating wastes—which is also painful? We need some kind of Government action. Perhaps rationing would be the thing that would remind people of the fact that we are going to have to be careful for a while.

Mr. HELLER. I think that is true. And at the same time, of course, just as there are very few economists that want long-run mandatory wage price controls, there are very few of us, I am sure, who would want any long-run gasoline rationing. We would like to end it as soon as we can. But I just think that through education and leadership from the White House, for example, and if not from the White House, then from people in Congress, we have got to get across the idea that the end of the Arabian oil embargo is not the end of our energy shortage problem.

Senator PROXMIRE. One aspect of our shortage problem which is very serious and which has no direct relation to the Arab embargo, is our refinery limitations, the fact that we are operating very close to refinery capacity, and well short of demand. What can we do about that in the short run? It takes a long time to build those refineries, 3 years.

Mr. HELLER. In the short run it is going to be extremely difficult, partly because at the moment we do not have enough oil throughput to use all the refining capacity we have. And it is going to be very hard to induce or bludgeon the oil industry to develop this petroleum refining capacity that we will need after the oil embargo is lifted and after we develop some of our own resources more fully.

Senator PROXMIRE. So that is another indication that we are going to have to find some way, either through price increases, tax increases, rationing or some kind of action, to limit consumption, because of the refinery capacity limitation.

Mr. HELLER. That is correct. I think it is going to be extremely difficult to get even the refinery expansions that we were talking about 3 months ago.

Senator PROXMIRE. Let me shift into something else very quickly.

Yesterday Mr. Stein told this committee that he in his estimates of the effects of the energy crisis on unemployment, ignored the prospects of a world recession. He felt that it was so hard to compute that he just could not figure them in, they work both ways and they are complicated. Pierre Rinfret, on the other hand, also said yesterday on the radio that he would accept the estimates for the Japanese Government and the European governments that they expected a very sharp impact on this economy if the embargo continued, with the Japanese economy, instead of growing 10 percent as it did last year declining 5 percent. The same thing with the European economy, they did not grow as much, but they would slow down an average of minus 5 percent. If that were the case, that sharp a recession—or maybe you could call it a depression—would not this have a very serious effect on employment in this country, simply because our exports would drop very sharply?

Mr. HELLER. Well, for example, in any projection for next year I am counting on something like a $5, $6, $7 billion export surplus. That could quite readily turn into a deficit, I do not think a huge deficit in that short a time, but that could turn into a deficit if we had the kind of cutbacks you are talking about.

Of course, that is one reason why a lot of people feel that there has to be some sort of geopolitical solution to this problem, that the devastating effects on some of the foreign economies are so great that we will see, not an expeditionary force, but widespread pressure for withdrawal of Israel to its previous borders, and so on. A lot of people do not believe that the Arabian embargo can go on all that long for that reason. Part of the difficulty now in a geopolitical sense and geoeconomic sense, if you wish, is that oil, like money, is fungible. Some of the oil being run through the international oil companies is finding its way to our shores, or indirectly through the Caribbean, even though presumably we are subject to embargo. So I think the rest of the world feels that they are being penalized in part to make sure that we do not get the oil. I think this is going to move the world more rapidly toward pressure on Israel in an attempt to find a solution.

Senator PROXMIRE. I think we can perhaps appreciate it somewhat by the fact that if this oil crisis is tough for us, it is infinitely tougher for other countries, especially Japan, which imports about 80 precent of its oil, is it?

Mr. HELLER. Ninety-nine percent; at least that is what they told us in a conference a month ago.

Senator PROXMIRE. Eighty percent from the Middle East?

Mr. HELLER. That sounds a little high.

Senator PROXMIRE. I have one more question. Before my time is up I would like to ask you about what seems to me to be a rather negative pessimistic-optimistic view of what is going to happen in the economy next year. You argued in the first quarter a drop of minus 1½, the second quarter, minus 1, and then you think it will improve, say plus 2 percent in the third quarter, and it may be even better in the fourth quarter. That must be based on an end of the embargo during the war or the kind of tougher politics that the administration seems to be resisting now, and no worldwide depression—which it seems to me if the embargo continues is almost inevitable—and some restoration of confidence in our Government, which has been a very serious and adverse economic factor, it seems to me. Now, I think all these assumptions are maybe not realistic.

Mr. HELLER. Well, I interpolated in my statement that my assumption that the administration would take decisive action before very long qualified me, or at least underscored my reputation, as an optimist. But I do think during this winter, as we get some plant closings, and as we get some horror stories about hospitals without enough energy, and as more and more service stations run out of gasoline, the administration will be once more forced against their will to take drastic measures, as they have in preceding economic crises. Therefore, even with an Arabian oil embargo continuing—to take the most pessimistic assumption on that score—we will be forced to a sorting out of the essential and nonessential uses in such a way that it will permit production and jobs to start recovering in the second half of the year.

Senator PROXMIRE. It sounds like you assume a much more active and direct role of the Government providing employment, a public employment policy, public service employment policy, and that kind of thing.

Mr. HELLER. I should say that while employment will be rising, unemployment will still be rising at the same time. In other words, I don't think——

Senator PROXMIRE. Unemployment, you say, will go over 6 percent?

Mr. HELLER. In the second half of the year.

Senator PROXMIRE. It will rise in the second half?

Mr. HELLER. It will continue to rise, because after all our output potential rises 4 percent a year, and the economy may be rising at something like a 2-percent rate, so unemployment will continue to rise virtually throughout the year. And that will call for very active Government policy through public employment programs and the like.

Senator PROXMIRE. Do you think those will be forthcoming when the situation gets bad enough?

Mr. HELLER. I would hope, although it took—after all, in the past the public service jobs program, as the Chairman knows all too well, took—how many shots before you finally got the administration to accept it?

Chairman REUSS. One veto, 3 years of delay, and finally a miserable little program—which has now been abandoned.

Mr. HELLER. Yes, essentially so. The White House was dragged kicking and screaming into this program. They rather silently exited from it. But it was in some ways encouraging to have Mr. Stein say

yesterday that the President had directed him to look into this as a possibility. That is precisely the kind of program that we need under these circumstances, both because it can be adjusted regionally, and it can be adjusted by job categories.

Senator PROXMIRE. One more question before my time is up on this round.

This is with respect to inflation. I presume that you make a rather favorable assumption on food prices in the coming year.

Mr. HELLER. I do.

Senator PROXMIRE. I presume that you have taken into full consideration the facts that the Cost of Living Council is going to expire on April 30, and it will be unlikely to be revived in anything like a mandatory form. Maybe with respect to fuel we will get something. Under the circumstances, what would you think of permitting the Cost of Living Council to have some kind of advice on energy prices?

As I understand it, that power is to be transferred to Mr. Simon's office. Mr. Simon has indicated a feeling that the solution to the energy crisis is through price increases.

Do you think the COLC should have some kind of veto power or review or something of the kind?

Mr. HELLER. You are expressing a concern that I share completely; that is, if the Shultz-Stein-Simon philosophy dominates the energy agency, and it is going to be the most powerful agency in Washington, with the possible exception of the Federal Reserve, as far as the future of this economy in 1974 is concerned. Under those circumstances there definitely ought to be some overall wage-price review board or Cost of Living Council, some monitor that relates energy policy, farm price policy, and other aspects of our inflation or anti-inflation battle to the broad overall picture rather than just——

Senator PROXMIRE. Absent that kind of overall review and control and overall interest, isn't there likely to be a strong bias on the side of price increases on the ground that that is one way of getting production, and this is what they will be looking at, and maybe in the long run that is right, but in the short run it is just devastating and it can be extraordinarily inequitable to moderate income people.

Mr. HELLER. That is right. Arthur Okun has made an estimate that we will be: "Transferring something like $50 billion to the oil industry, $20 per week per family, if we went to a sheer market clearing solution."

Senator PROXMIRE. $20 a week per family to the oil industry.

Mr. HELLER. I am quoting him.

Senator PROXMIRE. Of course we don't get much of it back because their taxes are in effect at the rate of 8 percent instead of 40 percent for most industries.

Mr. HELLER. That is correct. By the way, it occurred to me, as John Meyer was testifying, he suggested, for example, a weight or horsepower tax on automobiles. I completely concur in that. But you notice what happened. The moment the price controls were relaxed, the auto industry did just the reverse. It is putting $150 a car additional on the Pintos and other small cars, in other words, that is where we are putting the heavy tax by the pricing system. And the big ones I am sure since the market won't bear it, will get off with small increases. So the pricing system to which we bow down so low so often, is doing precisely the opposite of what a sensible energy policy would call for.

Senator PROXMIRE. My time is up.

Chairman REUSS. Taking up where Senator Proxmire left off, my own view of what is needed in the field of price-wage matters, once the present law runs out on April 30, as it will, is that we need two things. We need a price-wage review board in the large, sticky, noncompetitive administration price industries, which I think is what you have just suggested. Arthur Burns has suggested something like it, and Leonard Woodcock in days gone by.

Mr. HELLER. Exactly.

Chairman REUSS. I think what we need is a price ombudsman, a Ralph Nader-like, high-level Federal official who would ride herd on the rest of the Government. Because we didn't have such a person, Secretary Butz was able to get away with——

Mr. HELLER. Murder.

Chairman REUSS [continuing]. Agricultural murder on the consumer.

The ICC, as Mr. Meyer and others have pointed out, very often issues regulations and adopts policies which disregard the consumer.

Above all, in this energy field, if the powers that be, the SSS as you described, are going to try to solve all problems by raising prices, there really ought to be a still, small voice for the 206 million Americans who do the consuming.

Would you favor something like that as a political device for keeping price increases within some reasonable bounds, or at least having a public voice?

Mr. HELLER. Very strongly. I thought that was what Senator Proxmire was also implying. It is precisely those two elements—I notice Secretary Shultz also mentions the idea of an agency that would think about breaking through supply bottlenecks, and so forth. That, I think, would be another function of such an agency.

But these two are the paramount ones.

Chairman REUSS. I am happy to hear you once again break a lance for public service employment.

Would you agree that in addition to the reasons you have mentioned why such a program makes sense in the months to come that there is this additional, and very obvious reason for it, so obvious, probably, that you didn't think it necessary to mention it; namely, public service jobs chew up about as little raw materials and use up about as little energy as it is possible to imagine.

Mr. HELLER. I didn't mention it, but I should have. It certainly is one of the considerations—it is one of the things we ought to try to think about in all our public policies now. Housing, for example, the construction of housing is not particularly energy intensive. I don't know whether there are limitations with respect to the willingness of public utilities to hook up new customers for gas and electricity, and so forth. That is something that I just don't have enough information on. But I think that is one of the things we ought to be looking at very intensively, because a revival of housing might be one of the things that could be very helpful in 1974 from an overall economic policy standpoint and a minimum energy consumption standpoint.

Chairman REUSS. Thinking of next year, 1974, you have in a polite way rejected the traditional conventional wisdom of the Joint Economic Committee on monetary policy, which advice is traditionally to

the Fed, keep that supply of M–1 between 2 and 6 percent. You are saying, and the conventional advice also says, don't pay too much attention to interest rates. Where Chairman Patman is on the days we utter that I don't know, but anyway, that is what we utter. You really reject that, don't you? You think it is too mechanistic to focus as sharply as we do in our reports on M–1 and M–2 and given percentages and bans?

Mr. HELLER. I certainly do in the short-run sense. I think that the present development of the money supply in the last month or so is a perfect example of why one should not adhere rigidly to the money supply increase standard. The money supply approach is really much too exclusively concentrated, as the term implies, on supply. When people take their money out of the stock market, when they head for cover, so to speak, and build up their cash balances, the money supply, M–1 suddenly jumps. That is not a sign that Mr. Burns is being profligate and stimulating inflation, that is rather a sign that that increase in money demand ought to be accommodated so that it doesn't have a negative effect on the economy. That is why I think, for the time being, at least, we should be concentrating on that Fed funds rate and bringing that down and not worrying much about the money supply in the interim. I don't deny in the long run that there are strong correlations between the money supply advance and overall developments in the economy. But I just don't think we should have a money supply fixation that would result in sending out the wrong signals.

Chairman REUSS. Turning to fiscal policy for the year ahead, bearing in mind, as you surely do, that our situation is one of severe shortages and bottlenecks, obviously next year is no time for wild fiscal sloppiness in trying to keep the rate of unemployment from growing by just turning on the fiscal deficits figure.

Mr. HELLER. By definition, no time is the right time for wild fiscal sloppiness. But what you are saying is, we shouldn't flood the economy with aggregate demand when a good part of our problem is supply shortages and production botlenecks, and so forth. All I would say is that we had softening of the economy in prospect before the energy shortage. That softening is worse now. We shouldn't eschew monetary and fiscal stimulation as a weapon just because there are some shortages, and particularly because there are some specific shortage-induced price increases, notably in oil. It is true, we can't generate oil through monetary policy. But at the same time we can't do much about cutting down oil price increases through tight money either. I don't think we should be inhibited by that consideration in doing some of the things needed to stimulate the economy.

Chairman REUSS. So you would say a reasonable degree of monetary and fiscal stimulation, and try to blunt the effect of that on scarce commodities by rationing and allocation to the extent possible?

Mr. HELLER. That is correct.

Chairman REUSS. Or special taxes, or whatever?

Mr. HELLER. As I pointed out in my prepared statement, this is a period where the income elasticity of demand for petroleum products by consumers happens to fit the requirements of a redistributive fiscal policy at a time when we have so badly undercut the real income of the lower income groups by skyrocketing food and fuel prices. Perhaps it is a case of looking for good excuses for redistributive fiscal

policy—and this happens to be a good one—but the way we have cut into the real income of the lowest income groups requires us to do some restorative work in fiscal policy.

Chairman REUSS. Are you prepared now in mid-December to suggest an appropriate budgetary assistance for fiscal 1975, that is to say, should we shoot at a full employment budget balance, deficit, or surplus?

MR. HELLER. For fiscal 1975?

Chairman REUSS. Fiscal 1974.

MR. HELLER. It seems to me we should be moving to a full-employment deficit in the budget. I have not calculated how much that should be. We were doing the right thing in terms of economic, not social policy, this past year by moving sharply from a deficit toward a full-employment balance or surplus position. I think for fiscal 1975 we should reverse that direction.

Chairman REUSS. Just one more question. In your prepared statement you talk about a 10-cent-a-gallon-increase in the gasoline tax. You point out that it would help cut consumption. True, but it wouldn't help very much to cut wasteful consmption by people to whom 10 cents a gallon doesn't mean very much, and it would do an unfortunate lot to cut the consumption of the nice, just-above-poverty workers who have to drive 25 miles to work because that was the only house they could buy out in the country, and have already formed a little car pool, and they are still just making it with their wives working. That is pretty rough, isn't it? What I am getting at is, therefore, couldn't you combine, with your characteristic ingenuity, the rationing and the taxes a little better? Any rationing system it seems to me, including the samples we have had in the past, giving somebody—attempting to give somebody A and B coupons for essential work, getting to work typically, or if you are a salesman, getting around your territory—why not put your tax just on the additional luxury coupons? It seems to me it is administratively possible, you have to give out the coupons, so why don't you have the banker, or whoever is doing it, collect a dime a coupon a gallon? Wouldn't that assure you that essential gasoline was equitably distributed in the most egalitarian manner possible, and that as little as possible was syphoned off in excessive wasteful use?

MR. HELLER. I am not wedded to any one formula on this score. I think there are a great many very ingenious plans being proposed. It would seem to me that especially with the rather close connections between the administration and the "oiligarchy" of this country, the chances would be that excess profits would be devoloping. I find an excess profits tax an extremely difficult way to reabsorb those. So in part we should use the excise tax mechanism as a substitute for an excess profits tax, knowing that prices are going to be going up otherwise as a result of the market system, rather than the taxing system. Gasoline tax increases would also get revenues into the hands of the Government that could be utilized for very, very constructive purposes. I am not entirely comfortable about a $2 billion a year program that is not funded by some additional taxes. I would use part of these funds for a rational system of redistribution. But I must say, I don't have fixed convictions on the particular combination of rationing, negotiable coupons, and taxes that represent an optimum.

Chairman REUSS. Senator Javits.

Senator JAVITS. Thank you, Mr. Chairman.

Mr. Chairman, I note with interest that the chairman of the Public Service Commission of New York, Mr. Swindler, was here. It was my desire strongly to be here when he was. I noticed that he has endorsed the urgency of gas rationing, with which I thoroughly agree, and has made other observations and suggestions which I consider to be very high in importance, and to represent a very intelligent point of view.

I would like to ask Mr. Heller, if I may, two questions. I am not as acquainted with Mr. Meyer's testimony. I hope he will forgive me. I have not quite gotten to it.

But Mr. Heller, do you think that we need now some piece of machinery with money, say, in the order of a $5 billion availability, to administer the Employment Act of 1946? In other words, is not one of the deep failures of the Employment Act the fact that while it commits us to a policy, it provides nothing with which we can implement that policy. For example, we are going to need 1 million coal cars, I understand, to see us through the energy crisis. We are undoubtedly going to spend vast sums in not only research but in demonstration plants, pilot plants. We are going to open new coal mines. And Mr. Swidler, I see, testified that he doubted that this could be done out of private resources entirely. We are undoubtedly going to go in heavily for new mass transportation. We are already due to provide material by way of Federal credit to buses. We are going to retool the railroad system, which is really obsolescent anyway you look at it. Almost every concept is going to be renovated.

A fellow told me the other day, when we were talking about a water shortage, how much water it takes to flush a toilet. It sounds funny, but it is an inordinate amount. One of the great causes for the improper utilization of the water resources of this country is because we have not discovered, or at least have not put into effect, necessary measures to avail ourselves of the best technology on that score.

Those are some examples. There are many more. People are talking now about mercury lighting and certain types of heating, which would use less than the traditional wattage that we use normally, but which could be just as good if not better. Think of the retooling, once you got into that.

I have a bill in for that. Others may have better suggestions. Would you make any recommendations to us, in view of the fact that you have just testified that on a full-employment basis, I gather as an antirecession cushion, you could see us undertaking some of a deficit—would you have any recommedation to us as to any piece of machinery that ought to be installed to implement the Employment Act of 1946?

Mr. HELLER. That is a very large question. By the way, on the transportation parts of it I hope that John Meyer will respond.

When you speak about a piece of machinery, I take it you are talking about some Federal agency that would have command of this. Are you referring to $5 billion a year?

Senator JAVITS. Yes; I thought that we might consider an initial appropriation which could be drawn down and rolled over, because this is certainly not grant money.

Mr. HELLER. Yes; well, I would rather sidestep the question of machinery, other than to say that one would need to have a combination of lending power in such an enterprise and a means of recapturing the Government's research and development inputs by royalties—along the lines contemplated for the, thank heaven, dead SST—I hope it is dead, Senator Proxmire.

Senator PROXMIRE. So do I.

Mr. HELLER. If nothing else buried it, I should think the Arab sheikhs might have helped you along a little on this.

In other words, what I am saying, Senator Javits, is, in a lot of this energy-conservation-oriented research, the Federal Government has to do it, no one else will, it seems to me. I do not think the profit motive is going to lead to a lot of the things you have suggested. But if we develop methods that are going to save money in the long run and make profits, whether out of oil shale, or coal mining and so forth, we ought to have a system of royalties that get it back for the Government. But there are other things where there simply is no foreseeable private return. So I should think the kind of investment that you are suggesting is absolutely vital. And speaking of the proposed $2 billion a year for energy research and development, one could readily foresee expenditures building up to well over $2 billion a year that would pay off very handsomely for the country. I do not know that this addresses itself to the question you have in mind, but I am trying to express my sympathy for that kind of approach. What you are also suggesting, it seems to me, is that you could use this, in part, counter-cyclically if you hook it to the Employment Act of 1946. You must be thinking of ways and means by which we can utilize these funds in slack times to maintain full employment.

Senator JAVITS. You are absolutely right. Here we are running up against what the individual fears during a time of economic slowdown. The individual fears impairment of his earning power, or loss of his job. I think most people are not all that hot about hot-rodding on Sunday. They can live without that if they have to. But I think people genuinely fear the loss of their livelihood. Is this going to cause shutdowns, firing, and so on? What piece of machinery can remobilize the economy? We should be asking these questions now because this is a time of opportunity.

Jacob Schiff used to say, when asked before World War I how he made all those millions, that he brought junk railroads. And he was right, he did buy junk railroads and made something of them. It is the same with us. We have got an obsolescent economic system. And we are going to do a lot to modernize it right now. Now, that needs to be mobilized intelligently with a view toward the people's basic concern, which is their livelihood. And that is what I am suggesting.

Mr. HELLER. But then, what you are saying is, a lot of that is a longer haul proposition, particularly since we are thrown for the first time into a supply induced kind of crisis——

Senator JAVITS. Exactly.

Mr. HELLER [continuing]. And one that we economists, by the way, have not been very good in anticipating. You need the kind of measures that will overcome the longer run deleterious employment and income effects of it. But when you mention railroads and transportation I defer to Mr. Meyer.

Senator JAVITS. It is just a matter of handling this massive shift. It is one thing to set up an agency to handle the research and the allocations and the rationing or whatever other problem we have to undertake to meet this emergency; but it is another thing to reshape the economy, so that this not only meets this crisis, which to me is one quarter of the struggle, but takes great advantage of it.

Mr. Meyer.

Mr. MEYER. I think I should first report to Senator Proxmire that I looked at my source on net propulsive efficiency that we were discussing earlier and found that a highway bus on this engineer's scale rates at 140, which means that it is very efficient, and an intercity train from Manchester to London rates at 110. The U.S. SST was forecast as having an efficiency of 15 on the same scale. So if we had built the thing we would have an additional ramification to the energy crisis.

Senator JAVITS. You know, all of us have the distinction of being the one vote that swung the tie.

Senator PROXMIRE. Are you talking about the Concorde?

Mr. MEYER. No; the U.S. SST. I do not have the Concorde figures here.

Senator PROXMIRE. About 10 percent, one-tenth as efficient as the intercity bus, and the highway bus, and about one-half as efficient as an intercity train.

Mr. MEYER. On the railroad thing, I think it is easy to exaggerate the situation, looking at it from our view here in the northeast, Senator Javits. Certainly, the northeastern railroads are not in very good shape, and your description of them, I think, is quite apt. The fact remains, though, that there are some railroads that are in excellent shape, the Union Pacific and the Southern being two good examples, and there are several others that are in perhaps almost as good a condition.

The car problem, also, I think, is easily exaggerated. I know it goes against conventional wisdom, but I don't think the grain export difficulties last year were a railroad car problem. I think it was far more a bulk-shipping shortage which led to the cars piling up in the major ports, particularly Houston and New Orleans.

I would also point out that a great deal could be done in railroading simply by applying better management techniques to improve the utilization of the car fleet.

I also find it hard to believe that there is a need for public money to support more railcar acquisitions. Even a bankrupt road like the B. & M. just recently was able to finance acquisition of 750 new cars. It has plans to acquire more. In fact, I have a suspicion that they look upon the potential from turning themselves into something of a leasing company as a principal means out of their financial difficulties.

So in the face of all this, I would caution extensive involvement of the public sector in some of these private investment decisions.

Senator JAVITS. I would thoroughly agree with that. And, of course, I assume the highest form of discriminatory administration; by this I mean not getting into the act when you don't absolutely have to.

Mr. HELLER. Senator, one of the things that appeals to me about it—and it is suggested by what John Meyer just said—is that you need to mobilize brains. There isn't any substitute for brains and judgment in handling some of these problems. If you had some kind

of machinery, mechanism, and money that would gather knowledge, and make the analyses that are not being made now, for example, as to what extent is there a shortage of freight cars, and to what extent ships, for example, and then know how to convert knowledge into policy, it would be a great improvement over what is going on now.

Senator JAVITS. Thank you, Mr. Heller. Thank you, very much.

Chairman REUSS. I am grateful to you, Senator Javits, for recalling what Jacob Schiff had to say many years ago. I would suggest that his advice, buy young railroads, is not bad today, especially if they are coal carriers.

Senator Proxmire.

Senator PROXMIRE. Just a couple more questions.

I would like to say that Professor Meyer has a splendid statement. Frankly, I hadn't read it until I had a chance during the interrogation just now to glance at it. But you have some very useful recommendations. In part what you are saying is that we can improve the situation if the Government just gets lost in some of these areas, just gets out of it, and lifts its heavy hand, particularly with reference to the ICC, an enormous saving there—which startled me, because it was so specific, and at the same time it seemed to me to be a relatively easy decision to make. I am glad to see that. Senator Mansfield and I have proposed that the ICC be abolished. You said: "In general, most existing ICC regulations on surface freight transport are an invitation to inefficiency. Overall, economists suspect that $4 to $10 billion a year might be saved by simply eliminating most of these regulations."

I think that is a very striking observation from a professor of transportation at Harvard University, and a man who is an acknowledged expert in the area.

In your observation on what can be done and what can't be done, you have knocked down a lot of things that appealed to us as solutions or as short-term solutions, because they are long term, they are good maybe. But it would take quite awhile to put expanded rail transit into effect and so on.

You come down pretty hard for computer carpooling. You say that the thing—what you need to really give that a shove, is to have either prices go up or have gas rationing put into effect. That is the kind of thing that will step it up.

This computer approach is something new—of course, we didn't have that in World War II.

Mr. MEYER. No.

Senator PROXMIRE. What is the best way, do you think, to really get people to be fully aware of it, so that you might take advantage of it? It seems to me that if I got a note at my house saying that I could ride with so and so across the city and in the next block, that might have a lot more effect than just seeing something on television or the radio that there is a computer carpool that is available.

Mr. HELLER. You would run anyway, so you are not a very good example, Senator Proxmire. I was using that in a vaguer way. That is right. Run along with "Prox." But I was thinking of a carpool, not a running pool.

Mr. MEYER. You wouldn't have to make it totally impersonal, even if you had the computer involved. What you would use the computer

for, as in the Boston experiment that is now going on, is to try to identify people who live in the same neighborhood and have approximately the same work destinations, and then make these facts known to them and let them carry it on from there.

Senator PROXMIRE. That is exactly so. But how do we get it really moving? At the present time in Washington it is on the radio, it will help you with the carpool and so on. But it is not personal, it is not directed at John Meyer or Walter Heller, and you don't feel it involves you.

Mr. MEYER. In Boston you write in and give your place of work and your residence and indicate your willingness to carpool, or to carry people in your car. With the computer, they try to identify people with this willingness, and with reasonably close residences, and nearby places of work. They then pass the information on, the identities involved, and I guess count on neighborliness to carry it from there.

Senator PROXMIRE. Your suggestion as to cartelization of the commercial air service, that is one of the most practical ways of immediately conserving fuel, is that right?

Mr. MEYER. I am not suggesting it, I am just saying that that is happening—it has happened, it is well on its way.

Senator PROXMIRE. Is it a good policy?

Mr. MEYER. As a means of saving fuel it certainly is a good short-run policy.

Senator PROXMIRE. You say it will save a hundred thousand barrels a day, is that right?

Mr. MEYER. It perhaps already is. Certainly we did have an excessive number of flights on many of the route segments. For example, flights between New York and Los Angeles, nonstops, and New York and San Francisco, the last time I looked, were operating typically with load factors well below 50 percent. They were still economic for the airlines involved, because of the peculiarities in the so-called taper of the airline rate structure. The taper in the structure made it profitable for the airlines involved in these segments to fly big planes even half empty, because they could still make some money on them. Eliminating some of that inefficiency does not strike me as a disaster under the current circumstances.

I would add that the airlines are certainly not the most profitable segment of American industry. So, again, a short-run improvement in their earnings figures has some constructive effects. Now, of course, the interesting thing is that apparently the CAB is not factoring the calculation of these cost savings in at the same time it gives fare increases. One could say, I think, that perhaps a little more careful attention should be given to the tradeoff between further fare increases for the airlines and more permission to engage in these cartel practices to reduce their costs and excess capacity.

Senator PROXMIRE. I just can't resist asking you to give us your expert opinion on what we are being pressured on and lobbied on by the truckers. They want a speed limit higher than 55 miles an hour; they say the 55-mile-per-hour limit is not economical. Others dispute that. They also say that they are being exploited with the increase in fuel prices, which they say is very unfair. They are going to the extent of striking, apparently beginning today or tonight, many of them are.

Mr. MEYER. Well, there is a difference of opinion about the so-called economics. It depends upon whether one looks only at fuel or at total

operating costs. I think there is no doubt that their total operating costs are reduced by having a speed limit higher than 55 miles an hour. On the other hand, what I have seen of the evidence would suggest that those who contend that a 50-mile-an-hour limit or a 55-mile-an-hour-limit economizes on fuel, and diesel oil, are correct. So it is a tradeoff——

Senator PROXMIRE. And that is true of the trucks?

Mr. MEYER. It is true of the trucks, apparently, from what I have seen. My own view would be that if we had a more rational overall policy in place, if we started earlier to face up to some of these allocation problems, that we could have avoided many of these present difficulties. The kind of informal rationing, as I point out in my statement, that the truckers are being subjected to now is just terribly inefficient and unproductive. My guess is that overall we should not try to hold them to 55 miles an hour, that that increases their labor costs and their general operating costs too sharply in an economy that is already under enough inflationary strains without it. It is not the place to conserve on fuel in my view. In fact, my whole approach to the speed limit problem—though perhaps it would not be good in a dramatic sense—I would be happy to see simply a very vigorous campaign to enforce the existing speed limits rather than attempting to rollback to new and artificially low-speed limits that impose all these inefficiencies on buses, trucks, et cetera.

Senator PROXMIRE. I think we are getting a pretty good observation now of the 55 speed limit, and it is saving lives. But that is a good question.

Mr. MEYER. Yes; but I would be willing to contend that much of the fuel economy and much of the safety improvement that we are getting from the present 50-mile-an-hour speed limit could have been achieved by a vigorous enforcement, something that we aways should have been doing anyway, of the existing speed limits and laws.

Mr. HELLER. Senator, I just wanted to add that your question really raises a much broader principle in the saving of energy. Where we can make essentially equal savings of energy—to reap equal benefits, let's choose the route that involves the least costs. In the case of truckers, I am in thorough agreement with John Mayer that you should take into account not merely the energy saving at 55 and 50—and I think the evidence does suggest that there is some energy saving—but the total capital and labor costs that are inflicted in terms of longer trucking times, and indeed the impact on inflation, because transportation costs are bound to rise, and so forth. Or to use a more dramatic example, it takes 1 ounce of oil to produce a pair of panty hose. That is $1.50 or $2 item approximately. When talking about a fuel saving by cutting back productive activity, one ought to make these value-added comparisons across the board, and very carefully arrange fuel allocations accordingly.

That is why I was saying, in part, in reference to Senator Javit's question, there is just no substitute for brains and facts and analysis, because they are vital to help us minimize cutbacks in our energy use.

Mr. MEYER. Let me expand on that. Because we do not want to face up to the difficulties of implementing a formal rationing scheme, we are indulging in all these very curious forms of "congestion rationing," 55-miles-an-hour speed limits, Sunday closings, and so forth. The econ-

omist in me suggests that the likelihood is that we would distort fewer producer and consumer decisions if we just went over directly to a formal rationing scheme, at least if we had a sensible one where we have white markets and special outlets for special needs.

On the whole, it seems to me, we should just hand the gas over and say, this is your allocation, and if you want more you will have to pay an extra price for it, perhaps buy coupons at the post office, and then let people decide whether and how they want to use it themselves. Let truckers and others make their own decisions as to how they use it.

Mr. HELLER. I am awfully glad that he said that. Let me put it in the more or less enigmatic phrase, "rationing can help preserve economic freedom of choice."

Senator PROXMIRE. Milton Friedman would love you for that. I have gotten a letter from him, and I am sure you should have, that said: "We should not have rationing under these circumstances."

Just one more question. I can't resist asking it of you, Mr. Heller. You have been my economic guru for so long, and I think so highly of you, I have been at your feet for years. [Laughter.]

Mr. HELLER. That is always the prelude to a dangerous question.

Senator PROXMIRE. It should be. I cannot understand how you, of all people, can come out on the side of deregulating natural gas, the new gas, and then saying, let the older prices rise. They have already gone up a lot. They are regulated by the Federal Power Commission, which is overwhelmingly dominated by people who are very favorable to the industry. Two of them are in favor of deregulating natural gas all the way, and two more, making a majority of four out of five, are in favor of deregulating new natural gas and they are sympathetic to the industry.

This is a natural monopoly. So if you deregulate natural gas it means that the producers are able to squeeze the consumers, who have no choice, they are tied in with their equipment, they can't opt out of this very well, it takes years to do it, or a teriffic investment loss for the average consumer, and millions of people are going to be hit. You have a vehicle now, the Federal Power Commission, which asks a just price to get whatever production increase seems feasible, and make their judgment on that if they wish to do so. If you deregulate it, the best evidence we have is that the price would go from 25 cents a thousand cubic feet to 75, and maybe higher—it is selling at 90 now in intrastate where it is deregulated. So it just seems to me to be something that is enormously inflationary and very unjust, and we couldn't get much production, and it would have a windfall effect of something like $150 billion for the oil companies.

Chairman REUSS. Before you answer that question, may I say that I must leave for the floor. I would ask the surviving inquirers, Senator Javits and Senator Proxmire, to adjourn the hearings.

Senator PROXMIRE. That is my last question.

Chairman REUSS. Let me thank the witnesses once again for a memorable morning, for giving the Joint Economic Committee just what it wants to hear; namely, how do you do it.

Thank you very much.

Mr. HELLER. Senator, I put that one little paragraph in with a great deal of hesitancy and some diffidence. It is an enormously complex issue. I suppose if I were putting my priorities straight I would say,

first of all, let's change the regulatory structure around so that we don't sell this gas for next to nothing for industrial uses and to commercial users. That would be priority No. 1.

Priority No. 2 would be on the new gas as a stimulative measure for exploration, and so forth, to deregulate.

No. 3, I thought I had put it carefully enough not to suggest that we should deregulate all the way. But I do feel over the years that we have built up a rather artificial structure, and that we have promoted a lot of waste in the use of gas. I guess what I was really recommending is that we do permit some reasonable increases in the price of old gas, especially when we start thinking——

Senator PROXMIRE. Old gas, how would the old gas provide any incentive for increasing the exploration?

Mr. HELLER. I am talking there not so much about the supply side as the demand side, the utilization of the gas.

Senator PROXMIRE. On the demand side, though, the users, the household users are just pretty much imprisoned, they use a certain amount, because once you make your decision on getting a gas oven or a gas heating unit, that is it.

Mr. HELLER. But for the longer run, when you no longer can count on the pressure of the oil war to get people to cooperate, let's say, in holding down temperature and so forth, I think you have to have some reliance on the pricing measure.

Senator PROXMIRE. I would certainly agree wholeheartedly in allowing a free market where you can. But this seems to encourage monopolistic manipulation by producers that the consumer would be exploited badly.

Mr. HELLER. I share a lot of your concern, obviously. Probably I shouldn't have put in one cryptic paragraph on something that would take a whole statement.

Senator PROXMIRE. My predecessor, as the Senate chairman or vice chairman of this committee, Paul Douglas, felt deeply on this and made a heroic fight in the Senate for so long and unsuccessfully against deregulation, thanks to vetoes by Truman and Eisenhower.

Mr. HELLER. One thing I should say is that before we go into a large-scale program of coal gasification we ought to sort out our thinking on gas price regulation and be sure that what we are suggesting to do in coal gasification is economically sensible for the long run.

Mr. MEYER. I think what Mr. Heller is really trying to say, and I concur in it, is that we should begin to have a controlled deregulation or upward movement in the price of gas.

Mr. HELLER. Since 1968 it has gone up 30 or 40 percent. With the increases in energy and other prices being what they are and the problems of allocation and getting people to make more sensible choices about their use of energy being a very urgent problem, I think we must entertain or recognize that we can't allow just some of these energy prices to go up, but we are going to have to allow others.

Senator PROXMIRE. I agree with that especially on the side of the demand situation. But I am very concerned also about the windfall profit that you are going to get and what you do about it. Maybe you can do something about a trade off by ending some of the tax preferences.

At any rate, isn't a tax the way to use price to limit demand, especially on old gas, to prevent windfall profits?

Mr. MEYER. It is a possibility, and it certainly shouldn't be rejected out of hand.

Senator PROXMIRE. Let me ask you, gas is one thing. You can use the tax for other purposes.

The final point I have to make is that you are making a terrifically unrealistic political assumption, unfortunately, when you feel you can impose a gas tax for payments to lower income people, or even to mass transit. We have had a terrific battle, specially with the House, and with our Senate colleagues too, over breaking the Highway Trust Fund even for the most modest assistance to mass transit, even just to provide a lane that the buses can use, let alone provide all the other systems that you need for mass transit. So this is something that will take years to fight through Congress. You have a very determined, effective, well organized, tough lobby to overcome if you are going to use gas taxes for anything. That is not your problem. Your experts are recommending a course of action that seems in the public interest. But we do have that realistic problem.

Mr. HELLER. Senator, I understand that, particularly since my first job with the Federal Government was a job with a special highway research group in Madison, Wis., in 1938. I have been deeply imbued with the earmarked characteristics of any kind of highway revenues. But what better chance do we have of breaking that cover of the gasoline tax than the present energy shortage? I did an article for the Wall Street Journal last June on precisely that. If I may, I would like to submit it for the record, because it is relevant to the current situation.

Senator PROXMIRE. We would be happy to have it.

[The article referred to follows:]

A NEW ROLE FOR THE GASOLINE TAX

(By Walter W. Heller)

[As published in the Wall Street Journal, June 8, 1973]

Conserve energy, combat pollution, cut balance-of-payments deficits, curb inflation—and perhaps curtail oil profiteering and contribute to mass transit financing in the process? Is the gasoline tax, that old workhorse of highway finance, about to become the Secretariat of the fiscal world?

How well would a 5¢ boost in the present 4¢-a-gallon federal tax on motor fuels—which would add $5.0 billion to the present $4.4 billion of gasoline tax revenues—serve these new and glamorous purposes? Would some other tax device, say, a graduated auto excise tax, do a better job?

It is not easy to break out of our long-accustomed mold of thinking about the gas tax as strictly a highway user tax earmarked to pay for the benefits received or costs occasioned through our use of the highways. Together with state gasoline taxes averaging about 8¢ a gallon, the present tax puts about $13 billion a year at the disposal of the highway authorities who are converting 200,000 acres of land into highways during the current year.

To complaints that the tax is regressive, that it takes a higher proportion of the income of the poor than the rich, there has been a ready answer:

Too bad, but if that's their pattern of highway use, so be it. This tax is an earmarked charge levied under the "benefits received" principle of taxation, not a general revenue source that has to measure up to "ability to pay."

If we now blow its cover as a payment for highway services rendered, how are we to judge this tax? Here, the economist has a handy aid to clear thinking.

Judge it, as we do other general revenue taxes, by its effects on income distribution, economic stabilization, and resource allocation, to wit:

Distribution: Does it distribute tax burdens in a fair and equitable way?

Stabilization: In the present context, will it contribute to economic stability by easing inflationary pressures?

Allocation: Will it change the pattern or structure of resource use in a desirable way? Significantly?

DISTRIBUTION

Studies show that the motor fuel tax, taking into account the approximate 50–50 split between private and business use, is moderately regressive—about the same as the beer tax, but considerably less so than the cigarette and local telephone taxes. In addition, like all selective excise taxes, the gas tax penalizes those who, perforce or by preference, spend a higher-than-average portion of their income on highway transportation. On these counts, the individual income tax, which takes account of the size of income and family obligations and does not discriminate among taxpayers according to their spending patterns, is obviously superior.

But perhaps it's not that simple. Since the petroleum industry has the consumer over a (partially empty) barrel, it may be that the tax add-on will capture some of the scarcity-price premium that would otherwise go to the oil producers. To the extent that this happens in the short run (even in the face of Phase III's porous price restraints), one would have to judge the 5¢ add-on as a profits tax, as a means of sluicing some income out of the hands of U.S. oil companies and Arabian sheikdoms into the U.S. Treasury.

STABILIZATION

The portion of the motor fuel tax that bears on passenger transportation is effective in siphoning income out of the pockets of middle and lower income groups, and therefore offers some help in curbing demand. It is also argued that the gas tax increase could be simply and swiftly enacted—perhaps as a rider to the debt limit bill—so that its anti-inflation suction pump would soon be at work. It would serve as a bit of added insurance against excess-demand inflation—insurance which, if it proves to be unneeded, could be "cashed-in" for a somewhat less stringent monetary policy.

But surely, proponents of the gas tax boost would be ill-advised to rest their case in any significant way on its anti-inflationary impact:

Speedy passage is not in the cards if the highway lobby, pursuing its self-interest, makes common cause with liberals who rightly detest regressive taxes. Prolonged delay could bring the tax into effect just when the widely predicted slowdown of the economy takes hold.

To the extent that the tax is a business cost (nearly 50%) or absorbs profits, it is not very effective as an anti-inflation device.

Looking beyond its impact on demand-pull inflation, one finds an uncomfortable cost-push effect. With gasoline at roughly 40¢ a gallon, the 5¢ tax would increase the price of gasoline by 12½%. Since gasoline represents almost 3% of the cost-of-living index, this would be a one-month increase of 0.37% in the index.

ALLOCATION

Since the gasoline tax gets negative or mixed notices on equity and anti-inflation grounds, its claim to a new place in the fiscal sun must rest on its potential for cutting energy use and curbing pollution and congestion, that is, on its ability to divert resources to other and better uses. If it can significantly cut auto and truck use, spur gas-saving practices, and speed the shift to compacts and sub-compacts, it can eventually accomplish through the market system much of what may otherwise require sustained mandatory controls. (One could intensify the favorable allocation effect by earmarking the proceeds for mass transit or a massive attack on environmental decay and pollution.)

How do we appraise its potential for cutting the use of gasoline? On the face of it, the gasoline tax may seem to be a rather small tail on a rather large dog. A Federal Highway Administration Study last year showed the per-mile costs of operating a car to be as follows:

Standard: 13½¢ a mile, of which 2.8¢ is gasoline (including 0.8¢ in gasoline taxes).

Compact: 11¢ a mile, 2.4¢ for gasoline (including 0.7¢ tax).
Sub-compact: 9½¢ a mile, 1.8¢ for gasoline (including 0.5¢ tax).

Adding the 5¢ tax would increase the running costs of the standard car by about ⅓¢ per mile and the compact by about ¼¢ per mile, or about $35 and $25 per 10,000 miles.

In the light of these modest amounts, it may be surprising that a careful study just made by Data Resources, Inc. shows a sizeable response of gasoline consumers to a modest change in price. In technical terms, their study (using both cross-section and time-series data) shows a short-run price elasticity of minus 0.4 and a long-run elasticity of minus 0.7. The high visibility of gasoline purchases and the resulting impression that they are the biggest single cost of operating a car (actually, it is third of fourth) apparently contribute to this high price-elasticity of demand for gasoline.

Applying the DRI findings, one finds that a tax boost of 5¢ would induce a cutback of 5% in annual gasoline consumption, or 2% of total petroleum use. This would represent a saving of 130 million barrels annually out of our current consumption of 2.6 billion barrels of gasoline and 6.5 billion of petroleum products.

This is by no means a trivial saving (and it is one that could obviously be magnified by even greater tax boosts). It is roughly equal to this year's increase in gasoline consumption. If it were coupled with a plan to route the $4 billion-a-year of net added tax revenues ($5 billion minus $1 billion of income tax lost through deduction of gas tax on business tax returns) into less energy-and pollution-intensive uses, it could make a worthwhile contribution to the quality of life in these United States.

Once the gasoline tax is thus liberated from its highway-finance bondage, new fiscal vistas open up all around us:

Why not couple with the quick-acting gas tax increases a steeply graduated excise tax on new cars for the longer run? Graduation by gas mileage, as Congressman Vanik has proposed, would be one possibility. Another would be graduation by weight—for example, running from 10¢ a pound for small cars to 20¢ for the heavy-weight gas guzzlers. Either approach, while effective only on new cars, would accelerate the transition to light-weight cars.

If curbing energy use is the object, why stop with gasoline? Aren't there other non-highway uses of petroleum that are also candidates for curtailment?

For that matter, why stop with petroleum products? A graduated tax on natural gas with low rates on residential users, medium rates on commercial users, and high rates on industrial users might have some merit.

But let's not delude ourselves. If we travel the tax route to energy conservation and pollution control, it will be hard to take the regressive sting out of such taxes. Yet it must be done unless we are to ride past the energy crisis on the backs of the poor and near-poor.

The use of such taxes would, therefore, have to be accompanied by such moves as the following:

Exercise of great ingenuity in constructing such taxes, whether through graduated rates, as in the case of the suggested auto excise tax, or perhaps by building in of tax credits to shield the poor.

Use of the proceeds to strengthen social and welfare programs for the lower income groups, whether in the form of services, income support, or voucher systems.

Or if compensating action in the tax field is preferred, make the $80 billion-a-year of social security payroll tax less regressive by exempting poverty-level wages, allowing for family size, and removing the upper limit on the wage base.

When we have yet to cross the gasoline tax threshold, it may seem premature to consider these more far-reaching tax measures and their distributive impact. But if the energy crisis is real and persistent, these extensions of the logic of a re-oriented gasoline tax should and will force themselves on our attention.

Using taxes to reallocate resources into energy-conserving and pollution-free uses via market incentives rather than government regulation is an alluring game. But the more vigorously we play it, the more important it will be to keep the distributive effects of such taxes front and center.

Mr. HELLER. An economist always likes to show that he was a little bit ahead of the time, especially since there are sometimes cases where we are behind the times.

Senator PROXMIRE. We are going to use it as much as we can, those of us who are in favor of doing that, mass transit and for other purposes. But I want to point out that it is not an easy route even now.

Thank you very much. I apologize for detaining you. You have been most helpful.

The subcommittee will stand in recess until tomorrow morning at 10 o'clock.

[Whereupon, at 1:20 p.m., the subcommittee recessed, to reconvene at 10 a.m., Thursday, December 13, 1973.]

ECONOMIC IMPACT OF PETROLEUM SHORTAGES

THURSDAY, DECEMBER 13, 1973

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON INTERNATIONAL ECONOMICS
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room S–407, the Capitol Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representative Reuss.

Also present: Michael J. Runde, administrative assistant; Sarah Jackson, John R. Karlik, and Courtenay M. Slater, professional staff members; George D. Krumbhaar, Jr., minority counsel; and Walter B. Laessig, minority counsel.

OPENING STATEMENT OF CHAIRMAN REUSS

Chairman REUSS. Good morning. The International Economics Subcommittee will be in session to continue its hearings on the economic impact of worldwide petroleum shortages.

Today we shall focus on the impact of curtailed Arab oil production on the other major industrial countries.

Earlier this week we examined the direct effect on the U.S. economy of petroleum shortages. All the witnesses agreed the impact of the energy shortfall on the U.S. economy was serious and economic dislocations were likely. Administration witnesses considered the situation manageable, as unemployment would not exceed 6 percent and the price mechanism could be relied on to allocate resources. Other witnesses were less optimistic, seeing the need for immediate rationing, public service employment, and decisive action on the part of the Government to allocate fuels.

Today we will examine the effect of petroleum shortages on our allies in Western Europe, Canada, and Japan. To what extent will the curtailment of Arab oil production, resulting in fewer shipments of oil, cause a major slowdown in these economies? What effect would such a slowdown have on U.S. exports, and subsequently on American jobs? Will the United States be called upon to share its remaining imports with Western Europe and Japan?

Mr. Stein, in his testimony on Tuesday, suggested that his analysis showed the net effect of a slowdown abroad on the U.S. economy would be zero. Other experts have been less reassuring.

We shall also be considering arguments for a counter embargo of food and manufactured goods to the Arab countries. To what extent would the other industrial nations participate, or would such participation further jeopardize their remaining oil supplies?

This morning, Carl Beigie and Judith Maxwell of the C. D. Howe Research Institute in Montreal, Canada, will discuss the effects of production cutbacks on Canadian energy policy, and the prospects for future North American energy cooperation.

Richard Gardner of the Columbia University Law School will consider the issues related to a counter embargo.

Then we will hear from Gary Saxonhouse of the Economics Department of the University of Michigan on the impact of oil shortages on the Japanese economy.

Finally, Michel Vaillaud, formerly with the French Government, will comment on the effects of the shortages on European economies and the possibility of an oil sharing agreement in the Community.

We are most grateful to you all for being here this morning. Your very helpful statements under the rule and without objection will be received in full into the record.

I would now like each one of you individually or as a team to proceed. I would hope that you could hold your summary down to something on the order of 10 or 15 minutes because there are four presentations and we are anxious to save some of the time for questioning.

Mr. Beigie and Ms. Maxwell, would you start?

STATEMENT OF CARL E. BEIGIE, EXECUTIVE DIRECTOR, C. D. HOWE RESEARCH INSTITUTE, MONTREAL, CANADA, ACCOMPANIED BY JUDITH MAXWELL, DIRECTOR OF DOMESTIC POLICY STUDIES

Mr. BEIGIE. Mr. Chairman, I will deliver my opening remarks, but we will both be pleased to answer questions.

Let me begin by expressing our very great pleasure for being invited to be here today.

We are representatives of a country that is in a very privileged position in the sense that it has the potential for near-term self-sufficiency in energy production. Canada's potential in this respect is demonstrated by the fact that at the present time Canada's rate of domestic production of petroleum products exceeds its rate of domestic consumption of these products.

At the same time, however, we cannot be complacent with the potential for near-term self-sufficiency because of the fact that the existing transportation facilities in Canada are inadequate to deliver all of the surplus production in the western producing regions of Canada to the consuming regions throughout Canada.

Canada's oil policy in the past has, as in the United States, been forced to respond to a trade-off that exists between the security of supply accompanying domestic production, on the one hand, and the advantages to consumers and producers resulting from access to lower priced foreign sources of petroleum, on the other hand.

It goes without saying that the trade-off has been fundamentally altered in two ways by the events of recent months.

First, the use of oil as a political weapon has raised the importance that any responsible government must place on the security of domestic energy supplies.

Second, the use of oil as an economic weapon means that it can no longer be assumed that low-cost production will necessarily lead to low

prices so far as foreign energy sources are concerned. On both these counts Canada has been forced to move toward a new national energy policy, the main elements of which have begun to emerge in recent weeks.

But this new national energy policy will take time to implement and in the interim period there are going to be disruptions to the Canadian economy.

So in the remarks we would make this morning we would divide the impacts of the current situation into three stages. And we will be concentrating in the summary on the near-term stage.

We have provided some tables accompanying the joint prepared statement. In table 2 [1] it is shown that Canada's five eastern provinces import 100 percent of their oil needs compared to about 51 percent for the east coast of the United States.

Moreover, Arab countries provide about 30 percent of eastern Canada's oil supply, or about 300,000 barrels per day.

Now, if we just take the 25-percent cutback that would be assumed if Canada is indeed in the classification of a neutral country so far as the Arab nations are concerned, we are talking about a cutback to Canada of about 75,000 barrels per day. This is a difficult number to be precise about, because we don't know the extent to which Canada is indeed a neutral country in this classification. There are conflicting reports on this.

Furthermore, we do not know the maximum potential impacts until we know what the diversions might be that would result from the pressures that will be exerted on international oil companies to try and equalize the hardship of the current energy situation.

But the diversions plus the cutbacks from the Arab nations might result in the loss in supplies to Canada of an amount equal to as much as 200,000 barrels per day.

This range between 75,000 and 200,000 barrels a day amounts to between 8 and 22 percent of oil supplies in the eastern region, and between 5 and 13 percent of total energy consumed in that eastern region.

If the cutback is held to 75,000 barrels per day, Canada is going to be able to meet this through diversion of domestic production through three potential routes.

First of all, there will be an estimated 50,000 barrels per day that could be delivered by tanker shipments from Vancouver to the east coast of Canada via the Panama Canal.

There is an additional estimated 35,000 barrels per day, although this estimate is not precise at this time, that can be delivered to Ottawa via the reactivation of an unused product pipeline in eastern Ontario.

And approximately 100,000 barrels per day will be shipped by tanker through the St. Lawrence Seaway until it closes on or about December 20. And after the closing of the seaway during the winter freezeup, these shipments will be replaced by truck and rail movements. But there are severe limits on the amounts of these deliveries as a result of shortages of the necessary facilities.

Taken together, these three supplementary sources of domestic fuel would be sufficient to replace the oil loss in Eastern Canada as a result of a 25-percent cutback in Arab supplies alone. However, these three

[1] See table 2, p. 153.

routes would pretty well exhaust the potential for meeting emergency needs.

So, any shortages significantly in excess of 75,000 barrels per day will have to be met by curtailing demand in the eastern region.

Up to this point Canada has tried to adopt voluntary measures to cut back on demand. We are not very hopeful about the ultimate success of these voluntary measures, but this will be supplemented by the fact that prices in Eastern Canada have been allowed to rise in response to higher import prices, and prices will have a degree of rationing built into them.

Furthermore, in January there will be a supplement to these voluntary measures through the mandatory allocation of fuel oil at the wholesale level by a recently announced Energy Supplies Allocation Board.

Let me turn briefly to the impact of the cutback, both actual and potential, on the Canadian economy.

Prior to the Arab oil disruptions, forecasters were predicting that the Canadian economy would grow in real terms in 1974 by between 4½ and 5½ percent. The new forecasts that are now coming out in Canada call for a gain of between 3½ and 4½ percent in real GNP, which is a reduction of about 1 percentage point from the earlier forecasts, based on the assumption that the import cutbacks in Eastern Canada do not exceed the minimum amount on our range of 75,000 barrels per day.

These forecasts assume that there will be no direct impact from the oil cutback because of compensating diversions of Canadian production into the Eastern Canadian markets. The reduction in growth forecasts is due entirely, or almost entirely, except for the petrochemical companies, to the indirect effects on the Canadian economy of slower economic growth in Canada's export markets, particularly the United States. Exports account for 20 percent of Canada's GNP, so a reduction in the growth rates of our partner nations is going to have an immediate and direct impact on the Canadian economy.

In the event of more extensive cutbacks or diversions, we believe that it might be appropriate to shave another percentage point off the forecast for 1974, which gets us down into the range of 2½ to 3½ percent.

Now, these are very iffy numbers. And I think all we can really put forward to you today, Mr. Chairman, are three general conclusions that we would have about the likely impacts of the oil situation on Canada.

First, it is unlikely that Canada will experience a recession in the traditional sense as a result of foreseeable developments in the world oil situation.

Second, while a recession can be avoided in Canada in 1974, it is probable that growth will be affected sufficiently to result in some increases in Canada's rate of unemployment.

Third, while Canada does have a relatively high unemployment rate at the present time, 5.6 in November, for example, it would be inappropriate to regard this as an indication that Canada could be a source of large additions to the supply of goods for world markets even if the energy impact on Canada is kept at the low end of the range we have cited. Canada is extremely short of capacity in most industrial

sectors, and therein may lie one of the most important indirect impacts of the energy situation on Canada. Business has major plans to expand its capacity in Canada during 1974, but traditionally such investment surges have been accompanied by sharp increases in imports of capital equipment. If foreign suppliers are prevented from providing imports of capital equipment because of energy induced cutbacks in production—and this is particularly important in the United States for Canada—needed investment in Canada will be delayed, with negative effects on employment opportunities for Canada's rapidly growing labor force and on the rate of domestic inflation.

Let me turn now to the possibilities of the impact of this on Canada-United States energy trade.

During the last year Canada has increased its exports of oil to the United States by an estimated 24 percent—this is shown in table 4 [1]—to assist in alleviating the shortages the United States has been experiencing. The potential for further increases in these exports, however, is limited by two factors.

First, as in the United States, there are constraints in both the producing capacity of Canadian oil fields and pumping capacity of existing pipelines.

Second, the oil being shipped to Eastern Canada by the three methods noted earlier must, because of constraints on producing capacity in Western Canada, be diverted from supplies that might otherwise have been available to export to the United States.

In terms of looking to the future it must be recognized that Canadian reserves of conventional oil have fallen to 15 times current production in 1972, and are probably closer to 12 times 1973 production. So Canada in many respects in the conventional areas faces exactly similar situations as the United States.

Now, in terms of the implications of this, so long as Canada is forced to divert production from Western Canada to meet the emergency needs of Eastern Canada, and to the extent that facilities exist to permit this diversion, this will probably have to come at the expense of potential exports to the United States.

Furthermore, as we go into in some length in our remarks, there is also very little possibility for expanding natural gas exports or electrical power exports from Canada to the United States for exactly the same reasons: Shortages of capacity.

Therefore, let me turn quickly to the medium term. In the medium term I am afraid that the outlook for Canadian oil exports is even less favorable than in the near term. This is because of the impact of a pipeline that is going to connect Montreal to the western-producing provinces. This pipeline will divert oil that is presently going to the United States. It is hard to get details on this pipeline yet, but we expect that the Government is going to push to have it completed within 2 years. It is probably going to have a capacity on the order of 500,000 barrels a day. But it will probably not be used to full capacity, except in an emergency situation. A number like 250,000 barrels per day of normal throughput might be an appropriate estimate.

However, in terms of its own energy planning, the United States will probably have to operate on the assumption that the full capacity

[1] See table 4, p. 154.

of the Montreal pipeline of about 500,000 per day would be filled in the event of future oil emergencies. Thus roughly half the amount of Canadian oil now exported to the United States would be vulnerable to diversion to Canadian markets upon completion of the Montreal line.

The Montreal line must be regarded as a firm policy decision, but even so I think there are issues for negotiation between the two countries, and the tone of these negotiations may be important in terms of the longer term questions that I will turn to now very briefly.

We have attempted to provide you, Mr. Chairman, with a review of some of the major projects that are under consideration at the present time in table 7.[1] Let me pause just briefly to talk about two of them.

The first is the very massive tar sands that have huge potential supplies of oil in them. There are again, however, very severe limits on the pace with which these tar sands can be developed for export markets.

First of all, a very large percentage of the capacity in the tar sands, the reserves in the tar sands, lie below depths where strip mining is possible, and it is not as yet possible to be very confident about the feasibility of an economic method for in situ extraction of these reserves.

Second, there are severe logistical difficulties in dealing with projects of this tremendous magnitude. To get 125,000 barrels a day out of this system requires a capital investment in present terms of about $1 billion, and the plants take about 3 or 4 years to build.

The second project that I would like to pause on for a moment is somewhat more encouraging, particularly in the natural gas field at the present time. And that is the possibility of transmitting arctic resources, particularly natural gas, to markets throughout North America. A gas pipeline from the MacKenzie Delta to the Midwest is a definite possibility in the near term provided this pipeline can also carry gas from Prudhoe Bay in Alaska to achieve the economies of scale necessary for commercial viability.

The James Bay hydro project, while quite large in size and in financing, is not expected to lead to any significant firm long-term power supplies to the United States, but they can be available for interchange. This power is going to be needed in Canada.

I have only discussed some of the issue areas here, Mr. Chairman. I will not pause on this, because the time is running on.

Let me just conclude on a cautious note. Canada is not likely to be an aggressive seller of its surplus oil in the long term, and the United States in its turn, especially if it has achieved the goal of "Project Independence," may not be an eager buyer of Canadian oil. Therefore, if our two countries wish to see a cooperative approach to North American energy problems in the longer term outlook, they should recognize that the longer they wait to begin discussions toward this end, the greater the likelihood that their national energy policies will evolve along quite separate, although of a necessity parallel courses.

Thank you very much.

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[1] See table 7, p. 155.

[The joint prepared statement of Mr. Beigie and Ms. Maxwell follows:]

JOINT PREPARED STATEMENT OF CARL E. BEIGIE AND JUDITH MAXWELL[1]

CANADA IN THE NORTH AMERICAN PETROLEUM OUTLOOK

INTRODUCTION

Canada is privileged among the advanced industrial nations of the non-Communist world in having the capacity to achieve self-sufficiency in petroleum supplies in the fairly near term. Indeed, if its people are prepared to pay the necessary price, inclusive of environmental effects, Canada can continue to be self-sufficient in *energy* into the foreseeable future and still be a net exporter of energy, although not in the amounts needed to relieve substantially the mounting pressures for the development of new long-term energy sources in the United States, Japan, and Western Europe.

Canada's potential for near-term self-sufficiency in petroleum is based on the fact that its current rate of crude production exceeds domestic consumption. In 1972, for example, Canada produced 1.7 million barrels per day and consumed 1.6 million barrels per day. Thus, Canada has been able to achieve a modest net export position in crude petroleum and refined products, and this is a reasonable definition of a country with the potential for near-term self-sufficiency.

This aggregative balancing of domestic consumption against domestic production does not, of course, provide an accurate picture of the possible impact of recent Arab oil cutbacks on Canada. Production capacity for crude is confined to the western provinces, chiefly Alberta, and existing transportation facilities are inadequate to deliver all the surplus produciton in the west to consuming regions throughout Canada.

Specifically, as a result of Canada's national oil policy, dating back to 1961, the petroleum distribution network in Canada has been structured into two distinct segments. Markets to the west of the Ottawa Valley (an area including Toronto) have been supplied from domestic-source crude. The surplus of domestic production over consumption in this market area was available for export, with the logical destination being the United States. Markets to the east of the Ottawa Valley (an area including Montreal) have been supplied from imports, primarily from Venezuelan-source crude, but also from a number of other producing countries in the Middle East and Africa.

Canada's nation oil policy has come in for considerable second-guessing in the light of recent world oil developments. Still, this policy was a basically sensible compromise involving two national objectives: to foster the development of a domestic petroleum industry and, at the same time, to do so without imposing major cost penalties on domestic consumers in eastern Canada. In other words, this policy responded to the trade-off that existed between the security of supply accompanying domestic production and the advantages to consumers (and producers) resulting from access to lower-priced foreign sources. This trade-off also existed in the United States, where an essentially similar policy response was adopted through the import quota system. It should be noted, however, that until recently the perception of the security of supply issue was not anywhere near as acute in Canada as in the United States, and Canadian oil policy was influenced more by a desire to promote economic growth in its oil-producing areas than by a sense of real concern over potential disruptions in petroleum supplies from abroad.

It goes without saying that the trade-off noted above has been fundamentally altered in two ways by the events of recent months. First, the use of oil as a political weapon has raised the importance that any responsible government must place on the security of domestic energy supplies. Second, the use of oil as an economic weapon means that it can no longer be assumed that low-cost production will necessarily lead to low prices so far as foreign energy sources are concerned. On both these counts, Canada has been forced to move towards a new national energy policy, the main elements of which have begun to emerge in recent weeks.

[1] The authors are, respectively, Executive Director and Director of Domestic Policy Studies at the C. D. Howe Research Institute. The Institute, located in Montreal, is a private, nonprofit research organization concentrating on economic policy analysis. The authors are appearing at the hearings of the Joint Economic Subcommittee on International Economics in a personal capacity and not as representatives of the C. D. Howe Research Institute.

In responding to the questions put to us by the Subcommittee concerning the impact of the current oil situation on the Canadian economy and the near- and longer-term role of Canada in the North American energy outlook, we believe it is necessary to look at three different time intervals. The first interval extends from the present to the time when Canada will have the transportation facilities in place to meet adequately from domestic production any foreseeable net oil requirements in markets east of the Ottawa Valley. The second interval will extend from the time that these facilities exist to the time it will take to find and develop new sources of oil (and gas) and to bring these supplies onto the market. Finally, the third interval covers the period thereafter, when it will be feasible to deliver supplies from these new sources. It is impossible to be precise in the dating of these intervals, but we will attempt to evaluate the main characteristics of each of them in turn.

THE NEAR TERM

As already indicated, Canada's national oil policy has been to supply markets east of the Ottawa Valley—Quebec and the Maritime provinces—entirely from imports. The five provinces involved use oil for approximately 58 percent of their energy requirements, which is higher than the average of 45 percent for the country as a whole and for the United States, but about the same as the relative use of oil on the U.S. east coast. (See Table 1.) Quebec has the advantage of an abundance of hydro-electric power, however, which generates 99 percent of that province's electricity. The maritime provinces depend mainly on oil and coal-fired thermal generating stations for their electricity.

Because of its dependence on imports, eastern Canada is highly vulnerable to disruptions of international oil shipments. As shown in Table 2, Canada's eastern provinces import 100 percent of their oil needs, compared to about 51 percent for the eastern United States. Moreover, Arab countries provide about 30 percent of eastern Canada's oil supply, or about 300,000 barrels per day. Thus, the recent Arab oil cutbacks must be viewed as a very real near-term concern to Canadians.

The uncertain impact of Arab oil policy on Canada

There are conflicting reports on the extent to which Arab oil shipments to Canada are being cut back. Early reports suggested that Canada would be treated as a neutral country, meaning that the cuts would be 25 percent of planned shipments or about 75,000 barrels per day. (This cutback would be increased by about 15,000 barrels per day if the 5 percent reduction announced for January is implemented by the Arab producers.) Subsequent statements by industry executives, however, indicate that Canada (possibly because of its role as a supplier to the United States) could be subject to a complete embargo by one or two major Arab producers—an event which would obviously lead to even greater shortages. This suggestion must still be classified as a rumor, because it has not been confirmed either through diplomatic channels or in terms of the shipments of oil arriving in Canada.

In addition to uncertainties regarding Arab supplies, eastern Canada is concerned about the possibility that its normal supplies from Venezuela and other non-Arab producers will be reduced as a result of diversions of tanker shipments. Such diversions seem to be inevitable as the multinational oil companies are pressured to try to equalize supplies to assist areas such as Japan and Western Europe that are even more vulnerable to the Arab cutbacks. The Canadian energy minister, Mr. Macdonald, has indicated that such diversions might raise the loss in supplies to Canada to a total of about 200,000 barrels per day.

To summarize, eastern Canada probably faces losses of anywhere from 75,000 to 200,000 barrels per day in petroleum imports, depending upon the extent of Arab cutbacks and diversions of non-Arab supplies. This amounts to a range of between 8 and 22 percent of oil supplies and between 5 and 13 percent of total energy consumed in that region. There is some possibility that these losses might go higher if the embargo is prolonged, but we believe that this range is the relevant one under present circumstances.

Policies to accommodate Canadian shortages

Canada could make up a supply shortage of 75,000 barrels per day in the east (the low end of the estimated range) from domestic production without serious hardship in Canada. Its options for compensating for larger shortages, however, are severely constrained. Normal inventories of oil products average forty days'

requirements, and the energy minister has indicated that these inventories were up to forty-five days' supply in November, although no precise information is available. To augment these inventories, the Canadian government has made some spot purchases of heating oil on the international market.

The main course for meeting the requirements of eastern Canada, however, lies in arrangements for special shipments of domestic oil, and this is being accomplished in three ways:

1. An estimated 50,000 barrels per day can be delivered by tanker shipments from Vancouver via the Panama Canal.

2. An estimated 35,000 barrels per day (the exact amount has not yet been confirmed) can be delivered to Ottawa via the reactivation of an unused products pipeline in eastern Ontario.

3. Approximately 100,000 barrels per day will be shipped by tanker through the St. Lawrence Seaway until it closes on or about December 20. After the closing of the Seaway during winter freeze-up, these shipments will be replaced by truck and rail movements, but there are severe limits on the amounts of these deliveries as a result of shortages of tank trucks and tank cars.

Taken together, these three supplementary sources of domestic fuel would be sufficient to replace the oil lost in eastern Canada as a result of a 25 percent cutback in Arab supplies. At the same time, these three methods pretty well exhaust the potential for meeting emergency needs, so any shortages significantly in excess of 75,000 barrels per day will have to be met by curtailing demand in the east.

Up to this point, the Canadian government has confined its energy conservation program to a voluntary appeal to Canadians to turn down their thermostats by five degrees from their regular settings and to drive at reduced speeds. The success of such a voluntary program is unlikely to be too dramatic, in our opinion, but some results can be expected from the fact that gasoline and heating oil prices in eastern Canada have been allowed to rise to reflect higher import costs, and these price increases should have some rationing effect. Also, begining in January the voluntary conservation program will be supplemented by mandatory allocations of fuel oil at the wholesale level by the recently announced Energy Supplies Allocation Board.

To summarize, if cutbacks in oil imports are limited to 25 percent of Arab supplies, eastern Canada can survive the winter without a serious curtailment of industrial activity. However, any cutbacks beyond this magnitude would mean that, by spring, stocks of fuel oil would be dangerously low and refineries would not have the normal spring build-up of gasoline inventories. Thus, there would be a risk of gasoline shortages and, perhaps, a need to implement some form of rationing by spring. On the other hand, spring inventories would not be so low if the winter is mild, or if the Arab cutbacks are relaxed at an early date.

Conditions could, of course, become much worse than this. For example, if the next two months are unusually cold (we have been fortunate in eastern Canada thus far this year), fuel oil inventories could become dangerously low by late February, leaving Canadians with two more of our bitter wintery months without adequate fuel. This prospect becomes more likely the greater the cutbacks in Arab oil or the greater the extent of diversion of non-Arab shipments in the next two months.

If import cutbacks amount to as much as 200,000 barrels per day or more, people in eastern Canada would face the prospect of mandatory speed limits, closings of gasoline outlets on weekends, heating-oil rationing, and other energy-saving programs—including, as a last resort, the possibility of reduced hours in industrial plants.

Impact on the Canadian economy

Prior to the Arab oil disruptions, most economists had been forecasting that Canada's gross national product in constant dollars would grow by between 4.5 and 5.5 percent during 1974, a fairly good performance both in terms of Canada's long-term growth potential (estimated at 5.5 percent in real terms) and in comparison with the rates of growth expected in most other industrialized countries next year. Now, however, most forecasters have revised their estimates of Canadian real economic growth in 1974 downward by between one and two percentage points to reflect the impact of the energy situation. These new forecasts call for a gain of between 3.5 and 4.5 percent in real GNP, assuming that the import cutbacks in eastern Canada do not exceed 75,000 barrels per day.

The extent of these revisions may appear surprising in view of the interim supply arrangements described earlier. In fact, these forecasts assume no *direct*

impact of oil cutbacks on industrial activity in Canada, apart from possible shortages of feedstocks for petrochemical firms. The revisions are due almost entirely to the *indirect* effects of the slower economic growth in Canada's export markets that is expected to follow from the energy situation.

Exports account for over 20 percent of Canada's GNP, so a slowdown in demand from foreign markets has a major influence on Canada's economic performance. During 1974, Canada will be subject to two conflicting trends in export demand as a result of industrial slowdowns in Europe, Japan, and the United States. The first trend is that consumers in these countries will turn to Canadian-produced cars, appliances, and other finished goods to replace those normally produced in countries affected by the energy-induced slowdowns. But the second trend is that industries in these countries will be ordering less from Canadian producers of metals and other industrial materials. Because of the current capacity constraints in Canadian manufacturing and because of the dominant role of raw materials in Canadian trade, we believe that the net impact on the Canadian economy will be negative in 1974. That is the reason for the downward revisions in forecast GNP.

In the event of more extensive cutbacks or diversions of foreign oil supplies to Canada, leading to a reduction in fuel allocations to eastern Canadian industry, the impact on the economy would be more severe. In that case, Canada could expect very little industrial growth in the eastern region, combined with a possible reduction in the output of service industries such as transportation and tourism. This might shave another percentage point off the forecast for Canadian real GNP growth during 1974, but it would still indicate a gain for the country as a whole of between 2.5 percent and 3.5 percent.

These estimates are admittedly crude, for they do not allow for the potential spillover effects of cutbacks in Quebec plants which supply metals, chemicals, and other inputs to industries in Ontario and the west. Shortages of such materials would soon dampen economic growth in these regions as well, even though industry there has a secure supply of fuel.

Despite the limitations of forecasting methods for predicting the impact of the current situation in world petroleum on the near-term performance of the Canadian economy, we believe that three general conclusions are appropriate.

First, it is unlikely that Canada will experience a recession in the traditional sense as a result of foreseeable developments in the world oil situation. Western Canada, where most of the main producing centres are located, has secure energy supplies. In eastern Canada, some sacrifices will undoubtedly have to be made, but the prospects are that these sacrifices will not reach the point of requiring a sharp curtailment of economic activity.

Second, while a recession can be avoided in Canada in 1974, it is probable that growth will be affected sufficiently to result in some increase in Canada's rate of unemployment. The national unemployment rate was 5.8 percent in October. If the oil import cutback is confined to 25 percent, then GNP will rise by at least 3.5 percent. Nevertheless, this growth rate is below the country's long-term potential, and the unemployment rate would therefore rise to over 6 percent in 1974. But it is only fair to add that in the worst imaginable case of an extended shortage of 200,000 barrels per day, leading to fuel rationing for industrial uses, real GNP could grow by as little as 2.5 percent and in that extreme case, unemployment in Canada would rise to 7 percent or more. This rise in unemployment would be concentrated in the eastern provinces, which would be particularly distressing because unemployment rates in Quebec and the Maritimes are already much higher than the national average.

Third, while Canada does have a relatively high unemployment rate at the present time, it would be inappropriate to regard this as an indication that Canada could be a source of large additions to supplies of goods for world markets even if the energy impact on Canada is kept at the low end of the range we have cited. Canada is extremely short of capacity in most industry sectors, and therein may lie one of the most important indirect impacts of the energy situation on Canada. Business has major plans to expand capacity in Canada during 1974, but traditionally such investment surges have been accompanied by sharp increases in imports of capital equipment. If foreign suppliers are prevented from providing this equipment because of energy-induced cutbacks in their production, needed investment in Canada will be delayed, with negative effects on employment opportunities for Canada's rapidly growing labor force and on the rate of domestic inflation.

Near-term prospects for Canada-U.S. energy trade

To review, the impact of the oil shortages on eastern Canada could become serious if the Arab producers maintain the cutbacks in supply for an extended period and this leads to diversions of non-Arab imports away from Canada. In many respects, the five eastern provinces are in the same predicament as the U.S. east coast, which is also more dependent on Arab imports than are other parts of the United States. In effect, the eastern regions of both countries are isolated from domestic oil supplies by distance and by distribution bottlenecks.

In the total North American market, the Canadian and American oil distribution systems are intertwined from coast to coast. Table 3 shows that in 1972, Canadian oil exports to the United States accounted for a 6 percent share of the total U.S. market for oil. In Table 4 these exports are broken down to show the volume of oil moving from Canada to the United States at the two main distribution points. In addition to the Trans Mountain Pipeline, which supplies western Canadian petroleum to the U.S. west coast, and the Interprovincial Pipeline, which supplies it to the U.S. midwest, there is a northbound pipeline from Portland, Maine, to Montreal that carries the bulk of Montreal's imports from overseas.

While Canada supplies only 6 percent of the total U.S. oil market, it accounts for a large share of each of the regional markets it serves in the United States—as much as 100 percent in some areas. During the past year, Canada has increased these exports to the United States by an estimated 24 percent (see Table 4) to assist in alleviating the shortages the United States has been experiencing. The potential for further increases in these exports, however, is limited by two factors. First, there are constraints in both the producing capacity of Canadian oil fields and the pumping capacity of existing pipelines. (The situation is similar to the conditions in the United States where fields are reaching their production limits and exploration drilling has failed to uncover significant new sources of oil.) Second, the oil being shipped to eastern Canada by the three methods noted earlier must, because of constraints on producing capacity in western Canada, be diverted from supplies that might otherwise have been available for export to the United States.

Canada's current production of crude oil amounts to just over 2 million barrels per day, which comes from the conventional producing areas in Alberta, Saskatchewan, and British Columbia and from one small tar sands plant in Alberta producing 50,000 barrels per day. The conventional fields have been producing at close to their capacity limits, and earlier this year the Canadian government was forced to impose controls on the export of oil in order to ensure that enough oil would be available to supply Canadian refiners. All oil not used by these refiners was licensed for export to the United States, but in recent months the export allocations have been below the requests from U.S. refiners.

Furthermore, because of disappointing results from recent exploration programs in the conventional producing areas, the National Energy Board estimates that Canada's reserves of conventional oil had fallen to 15 times current production in 1972, and these reserves are probably close to 12 times 1973 production. As a result, even before the current cutbacks of Arab oil, the Canadian authorities had become concerned about the rapid rate of reduction in Canada's petroleum reserves, and the National Energy Board, which regulates Canada's energy exports, has called for hearings to decide how much of the remaining oil reserves should be retained for Canadian use. In effect, this decision will set a limit on the amount of oil that can be exported from conventional sources in the future. (It is the practice in Canada to keep natural gas reserves equal to 25 times the demand expected in four years' time for Canadian use. Reserves above that level can be exported, but since 1971 reserves have been below the required level and no new export contracts have been allowed. In the past, no similar arrangement had existed for oil.)

What are the implications of this situation for Canadian oil exports to the United States in the near term? First, so long as Canada is forced to divert production from western Canada to meet the emergency needs of eastern Canada, and to the extent that facilities exist to permit this diversion, this will probably have to come at the expense of potential exports to the United States. The only other alternative, given existing circumstances, is for western Canada to embark on a fuel conservation program to free up additional production for shipment to eastern Canada and the United States. However, the government's decision to extend a price freeze on petroleum products in western Canada throughout the

remainder of this winter is not designed to encourage such conservation. At the same time, if the North American energy situation becomes much more serious, it is likely that western Canadians would be willing to participate in a conservation program to assist in meeting the emergency.

Even when the current oil emergency ends, and irrespective of the decision of the National Energy Board on exportable reserves, the potential for increased oil exports from Canada in the near term is very limited. Engineering studies of conventional oil fields indicate that production capacity will peak at approximately 2.2 million barrels per day sometime in the next two years. Any significant production increase above that level will require either major new oil discoveries or more extensive development of the Athabasca tar sands—a prospect that will be discussed more fully later. Meanwhile, Canadian demand in the western market has been increasing at an average rate of 5.4 percent a year.

If so little potential exists for increased Canadian oil supplies in the near term, what are the prospects for natural gas and electricity? Natural gas exports from Canada serve about 4 percent of the U.S. market, with most sales concentrated in the midwest and on the west coast. (See Table 5.) These sales have not been increasing in recent years, however, because, as noted earlier, the National Energy Board has ruled that Canada does not have the reserves to justify new export contracts. And since no new contracts have been approved since 1970, pipeline facilities have not been expanded and hence there is little room for transmitting additional supplies even in an emergency.

Canada's electrical utilities are interconnected wtih neighbouring U.S. utilities, allowing them to share emergency supplies and to interchange power for peaking purposes. Canada-U.S. trade in electricity is shown in Table 6. We have learned from a spokesman for Hydro Quebec, the provincially-owned utility in Quebec, that this company is now exporting at the rate of 800 megawatts of firm power and 200 megawatts of interruptible power via Ontario Hydro's link with the Power Authority of New York. He indicates that Quebec is exporting all the spare power it has and that the transmission lines from Ontario and Quebec to the eastern United States are being used to full capacity. Thus, it would appear that Canada cannot increase its supplies and might, in the face of the current oil emergency, have to cut back on existing supplies to meet domestic requirements.

In summary, Canada has made a substantial contribution to U.S. energy supplies in 1973 by increasing its oil exports by 24 percent over 1972. We are also supplying all the electricity and natural gas that existing transmission facilities can carry. We have not curtailed energy supplies to a neighbour in need. However, Canada cannot increase its assistance to the United States to any significant degree during the current oil emergency, and even when the oil emergency eases, capacity constraints will be a major limiting factor for Canadian energy exports in the near term.

THE MEDIUM TERM

The outlook for Canadian oil exports is even less favourable in the medium term than in the near term. This is because the Canadian government has decided to build a pipeline connecting Montreal to western supplies. The petroleum carried in this line will have to come, at least initially, from oil exports to the United States. This conclusion follows from the earlier discussion of capacity constraints on Canadian oil production.

The earliest that the pipeline to Montreal can be completed is mid-1975, but a more likely estimate is early 1976. The government has not as yet announced the size or the route of the pipeline, but it has decided to place steel orders immediately in preparation for an early start on construction. When the line has been built, it apparently will not be operated at capacity except in the event of an emergency, but this may change depending on world oil price and supply developments. An unverified report is that the line will operate at half its capacity, delivering about 250,000 barrels per day to Montreal. There would, in this case, still be room for substantial imports into the Montreal market. Indeed, there is considerable sentiment for making the flow of this pipeline reversible in the event that import prices should drop sharply or significant oil reserves were to be found in the offshore Atlantic region.

In terms of its own energy planning, the United States will probably have to operate on the assumption that the full capacity of the Montreal pipeline of 500,000 barrels per day would be filled in the event of a future oil emergency. Thus, roughly half of the amounts of Canadian oil now exported to the United States would be vulnerable to diversion to Canadian markets upon completion of the Montreal line.

Canada is just as committed as the United States to improving the security of its oil supplies as quickly as possible. Therefore, the Montreal pipeline must be regarded as a firm policy decision. There are, however, issues for negotiation between the two countries, including the route of the line, possible increases in the capacity of the Interprovincial Pipeline, which extends in part through U.S. territory, and the regional distribution of Canadian oil cutbacks in ways that will provide the least disruption in the United States. It may be, for example, that the United States would prefer to do without the Canadian oil now being shipped to the west coast—it could be replaced with oil from Alaska—and maintain as much volume as possible to the midwest. Negotiations of these issues in a spirit of cooperation could set the tone for future discussions involving longer-term energy possibilities in which Canada can be looked to as a potential source of increasing energy supplies.

THE LONGER TERM

Potential Projects

Table 7 outlines major new energy projects that are under serious consideration in Canada at this time. Column 4 in this table gives a rough idea of potential exports to the United States for these projects. The most immediate prospect for increased energy supplies in more intensive development of the vast Canadian tar sands and heavy oil deposits. Indeed, if the construction of the tar sands plants proposed by Syncrude Canada Limited and Shell Canada Limited receive government approval in the near future, Canadian oil production will be boosted by about 250,000 barrels per day by the 1980s. This new production will help to offset the impact of the Montreal pipeline on export levels.

While the Canadian government has indicated that it plans to encourage actively the development of the tar sands, there are again very severe limits on the pace with which this development can proceed. For one thing, it is not yet feasible to extract oil from the large percentage of the tar sands that lies below depths where strip mining is possible. If oil prices remain sufficiently high, *in situ* techniques will be developed, but the Canadian government is anxious to pace the rate of extraction so that it can be, to the extent possible, on an orderly basis—"orderly" meaning that deeper depositts are utilized well before the lower-cost deposits just below the surface are run down too extensively.

Another problem area in tar sands development concerns the logistical difficulties involved in the construction of an operational extraction plant. This method of energy supply is highly capital-intensive (the plants cost up to $1 billion and take three to four years to build), and there are limits on the rate at which equipment, materials, and skilled manpower can be supplied for the construction process, to say nothing of the time it takes to provide for the infrastructure needs of communities that wil have to be located near these plants. It might be possible to handle these logistical problems without serious strain if development proceeded at the rate of one 125,000-barrel-per-day plant every two years. Rapid development of the Canadian tar sands would provide an important addition to Canadian petroleum reserves, and the Canadian government has indicated that the development of the tar sands for export will be encouraged. However, it must be remembered that Canadian domestic energy needs are growing rapidly, so oil from the tar sands will be needed to supplement production from the conventional regions to meet Canadian demand. This will limit the extent to which this new source of oil can contribute to meeting U.S. energy requirements in the foreseeable future.

Arctic resources, particularly natural gas, provide a more substantial longer-term source of potential exports to the United States. A gas pipeline from the Mackenzie Delta to the midwest is a definitive possibility, provided that this pipeline can also carry gas from Prudhoe Bay in Alaska to achieve the economies of scale necessary for commercial viability. All the Prudhoe Bay gas would, of course, be available to U.S. markets, together with a portion of the Canadian gas. While this portion cannot be determined precisely until a ruling is made by the National Energy Board, it could amount to as much as 1 billion cubic feet per day.

The James Bay hydro-electric project, while vast in scale and in terms of financing required, will not produce any export potential except for the purpose of peak interchanges. Canada will need the power from this project by the time it is completed in 1985.

Other major exploration programs, involving oil and gas in the Canadian Arctic and the Atlantic offshore regions, are potentially promising, but results as of this time are such as to indicate caution. These projects are really long-term

in the sense that deliveries could not be anticipated prior to the middle or late 1980s.

The issue areas

This summer the Canadian government released an energy policy analysis that indicated that Canada could have the potential to supply up to 10 percent of U.S. oil requirements by 1985. (Ten percent of expected U.S. oil demand in 1985 would be about 2.5 million barrels per day, or about 2.5 times the level of Canadian oil exports in 1972.) Exports at this level would require a major commitment of real and financial capital and would imply considerable success in exploration activities and in the development of transportation technology.

Canada could therefore be a significant factor in the longer-term oil outlook for the United States, provided the two countries decide that a major expansion of their oil trade is appropriate. Before such a decision can be reached, however, a number of major issues will have to be resolved, and we conclude this presentation with a brief review of some of the elements of these issue areas.

From the U.S. standpoint, a determination must be made on the role it might wish to see Canada play in the program President Nixon has called "Project Independence." It is clear that in its search for increased self-sufficiency in energy supplies, the United States is going to be accelerating the development of its shale oil and of nuclear energy. (Canada, it might be noted, is still prevented from exporting uranium to the United States by U.S. trade restrictions.) In addition, the United States is likely to make greater use of its large coal reserves in the years ahead. Taken together, these energy sources provide potentially vast amounts of fuel for the United States, although at higher prices than Americans have been accustomed to paying for their energy supplies.

Canadian energy from the tar sands and from the frontier areas is likely to compare quite favourably in terms of price with alternative energy sources in the United States, but this energy would not be as "secure" as domestic U.S. sources. Therefore, the United States will have to evaluate the trade-off between price and security in determining its approach to Canadian energy supply issues. We would note that the decision to build the pipeline to Montreal, while it will have short-run disruptive effects on exports to the United States, does make Canada a more secure location in terms of additional energy supplies discovered beyond those required for domestic consumption. In other words, Canada's efforts to make its own supply situation more secure will, in the longer term, make Canada a more secure source of energy exports to the United States.

On the Canadian side, the issue areas centre on questions arising from a desire to ensure balanced economic development. Canada will have to make substantial investments on its own in order to get the oil it needs for domestic consumption out of the tar sands and the frontier. To push these developments even further for export markets could have major repercussions for other sectors of the Canadian economy. For example, Canada is likely to need up to five tar sands plants costing nearly $5 billion in current dollars to meet its own oil needs during the next decade. The tar sands will support many more plants than these five if export projects were to be approved, but the problems of mustering, say, another $5 billion plus the men and materials needed for these projects would put a severe strain on the economy—which is only one-tenth the size of the United States.

Even if these problems were overcome by a joint Canada-U.S. development program, there would be further obstacles once the plants began operating. Large export-oriented energy projects in Canada would bring in substantial earnings of foreign exchange, and these earnings could cause problems for a country that is trying to run an economy composed of a balanced distribution between manufacturing and resource-based industries. Just as massive trade deficits can cause major economic dislocations, a large surplus can similarly disrupt a nation's economic activities. The net earnings from energy exports would tend to push up the exchange rate and make it more difficult for manufacturing and perhaps even mining companies to compete in world markets. Therefore, such export-oriented energy projects would be a mixed blessing in terms of Canada's desire for balanced economic growth.

There are a number of ways that cooperative actions by Canada and the United States could ease the potential strains that have been mentioned. Furthermore, Canada has an interest in achieving such cooperative measures because of the necessity to have access to U.S. markets to achieve the economies of scale in its frontier activities to make commercial development for Canadian markets more efficient.

We conclude on a cautious note. Canada is not likely to be an aggressive seller of its surplus oil in the longer term. The United States, in turn, especially if it has achieved the goals of "Project Independence," may not be an eager buyer of Canadian oil. Therefore, if our two countries wish to see a cooperative approach to North American energy problems in the longer-term outlook, they should recognize that the longer they wait to begin discussions towards this end, the greater the likelihood that their national energy policies will evolve along quite separate, although of necessity parallel, courses.

TABLE 1.—A COMPARISON OF THE USE OF OIL IN CANADA AND THE UNITED STATES, 1970

[Percentage of total energy demand]

	Canada	United States	Eastern Canada	Eastern United States
Oil	45.0	44.0	58	57
Gas	20.0	32.0	2	17
Coal	11.0	20.0	4	23
Hydro	24.5	4.0	36	2
Nuclear	.2	.3	0	1
Total	100.0	100.0	100	100

Source: Department of Energy, Mines, and Resources, "An Energy Policy for Canada, Phase 1", vol. I (Ottawa: Information Canada, 1973), p. 33, table 3. The Chase Manhattan Bank, "Outlook for Energy in the United States to 1985" (New York, June 1972) pp. 30,34.

TABLE 2.—SOURCES OF OIL IMPORTS BY CANADA AND THE UNITED STATES

[Percent of total oil demand in 1973]

	Canada [1]	United States [2]	Eastern Canada [1]	Eastern United States [2]
Arab imports	15.4	4.3	30.0	3.9
Non-Arab imports	36.1	11.5	70.0	10.5
Product imports		17.0		35.5
Total imports	51.5	32.8	100.0	50.9

[1] Based on "Oilweek" estimates of 1973 demand.
[2] Based on imports and demand during 1st quarter of 1973.

Sources: Donald S. Macdonald, Canada, "House of Commons Debates," Nov. 26, 1973 (Ottawa: Information Canada 1973), p. 8138. Donaldson, Lufkin, & Jenrette Securities Corp., "Policy Bulletin," November 1973, p. 10.

TABLE 3.—CANADA'S OIL EXPORTS TO THE UNITED STATES

[In thousands of barrels per day]

	1962	1972	1973
Domestic demand	938	1,589	1,650
Exports:			
Crude oil	236	951	1,175
Products	16	193	(1)
Total demand	1,190	2,733	(1)
Production:			
Crude oil	715	1,689	2,081
Gas plant LPG	16	130	160
Imports:			
Crude oil	369	757	850
Products	83	142	0
Total supply	1,183	2,718	3,091

[1] Not available.

Note: Exports as percent of Canadian production, 68 percent; Canadian share of U.S. market, 6 percent.

Sources: 1962 and 1972—Department of Energy, Mines, and Resources, "An Energy Policy for Canada, Phase 1," vol. I (Ottawa: Information Canada, 1973), pp. 38 and 127. 1973—Estimates by "Oilweek," Oct. 15, 1973, pp. 28, 30, 36.

TABLE 4.—A BREAKDOWN OF CANADIAN CRUDE OIL EXPORTS, 1972–73

[In barrels per day]

	1972	1973[1]	Percent increase
Exports to U.S. west coast via trans-mountain pipeline	269,000	275,000	+2.2
Exports to U.S. midwest via interprovincial pipeline	678,600	900,000	+32.6
Total exports of crude oil	947,000	1,175,000	+24.0

[1] 9 months' shipments, adjusted to an annual rate.

Source: "Oilweek," Oct. 15, 1973, p. 24.

TABLE 5.—CANADA'S NATURAL GAS EXPORTS TO THE UNITED STATES, 1962, 1972

[In billions of cubic feet per year]

	1962	1972
Domestic demand	432	1,256
Exports	343	1,012
Total demand	775	2,268
Marketable production	769	2,252
Imports	6	16
Total supply	775	2,268
Exports as percent of Canadian production		45.0
Canadian share of U.S. market		4.2

Source: Department of Energy, Mines, and Resources, "An Energy Policy for Canada, Phase 1," vol. I (Ottawa: Information Canada 1973), pp. 41, 128.

TABLE 6.—CANADA'S TRADE IN ELECTRICITY WITH THE UNITED STATES, 1967, 1972

[In millions of kilowatt hours]

	1967	1972
Exports to United States	3,994	10,372
Imports from United States	4,181	2,440
Net exports	−187	7,932
Net exports as percent of Canadian generation	−0.11	3.32
Net exports as percent of U.S. generation	−.02	.46

Source: Department of Energy, Mines, and Resources, "An Energy Policy for Canada, Phase 1," vol. I (Ottawa: Information Canada 1973), p. 129.

TABLE 7.—MAJOR POTENTIAL ENERGY DEVELOPMENTS IN CANADA

Project	Current status	Potential output	Possible export capacity	Price range in 1972 dollars
1. Athabasca tar sands $8,000,000 to $1,000,000,000 per plant.	1 plant of 125,000 barrells per day in advanced planning stage; a second one of the same size under serious consideration. Construction takes 3 to 4 years.	65,000,000,000 barrels by open pit mining; 236,000,000,000 barrels in deeper formations.	As many as 5 plants needed to serve Canadian market by 1985—any additional plants could export.	$5 per barrel to $6.
2. Canadian arctic gas pipeline from Mackenzie Delta and Prudhoe Bay to the midwest. $5,400,000,000.	Applications for construction permits expected in 1974, requesting permission to begin work in 1975–76 and begin exporting gas in 1978 or 1979.	2,000,000,000 ft³ from Alaska and 2,000,000,000 from Canada.	2,000,000,000 ft³ of Alaskan gas and part of the Canadian gas.	$1 per thousand cubic feet delivered to south.
3. James Bay hydroelectric project—northwestern Quebec. $6,000,000,000.	Construction underway but being challenged in courts. 1st output expected in 1981.	8,300 MW	None, except for peak interchanges.	11 mills delivered to Montreal.
4. Polar gas project pipeline from King Christian Island to eastern Canada and United States. Cost not known.	Feasibility studies underway. Technical problems in island hopping still to be solved. Significant quantities of gas have been discovered.	Probably about 4,000,000,000 ft³ per day	A major portion could be exported	Approximately $1.25 delivered to south.
5. East coast offshore—off Nova Scotia and Newfoundland. Cost not known.	Exploration results to date are not encouraging.	Not known	Exports would depend on needs of eastern Canada.	Not known but less than $1 per thousand cubic feet.
6 Mackenzie Valley oil pipeline from Mackenzie Delta to southern Canada.	Oil discoveries still not large enough to justify work on pipeline preparation.	Probably about 2,000,000 barrels per day	A major portion could be exported	$4 per barrel.

Source: Judith Maxwell, "Energy From the Arctic: Facts and Issues" (Montreal and Washington: Canadian-American Committee, 1973). Department of Energy, op. cit.

Chairman REUSS. Thank you, Mr. Beigie.
Mr. Gardner, please proceed.

STATEMENT OF RICHARD N. GARDNER, PROFESSOR OF LAW AND INTERNATIONAL ORGANIZATION, COLUMBIA UNIVERSITY

Mr. GARDNER. In accordance with your request, I shall concentrate on the implications of the Arab oil embargo for U.S. foreign economic policy.

In August 1941, Franklin Roosevelt and Winston Churchill met on a destroyer off Newfoundland to draft the Atlantic Charter, a statement of postwar aims which could unite freedom-loving people everywhere in the fight against facism. The fourth paragraph of the charter proclaimed the principle of "access, on equal terms, to the trade and to the raw materials of the world."

The motivation behind the fourth paragraph of the Atlantic Charter was simple. The leaders of the wartime alliance believed that peace could not be achieved unless it had a sound economic basis. The experience of the first four decades of this century suggested that if countries were denied access to raw materials and markets, they might be tempted to secure them by force—or at least would seek to justify aggression on the grounds that they were denied the opportunity to meet their economic requirements through peaceful means.

Cordell Hull, the father of the trade agreements program, was a believer in the theory that "if goods can't cross borders, armies will."

This perception of the close relation between economic policies and peace had a profound influence not only on the Atlantic Charter but on other wartime statements and on postwar planning.

Yet despite this background, international economic negotiations from the end of the Second World War to the present time have focused almost entirely on access to markets and have virtually ignored the problem of access to supplies. The reason for this one-sided emphasis is obvious—for most of the postwar period the central problem seemed to be how to avoid depression and unemployment by selling goods to other countries. Now, however, we are moving into an era of resources scarcity and accelerating inflation—an era which requires a new approach to international economic policy, or perhaps we should say a return to the old and forgotten perceptions which lay behind the fourth paragraph of the Atlantic Charter.

Raw material access has acquired a new importance for the United States. By 1985 our country, even if it achieves energy self-sufficiency, will be primarily dependent on imports for 9 of the 13 basic minerals required by a modern industrial economy. As Lester Brown has pointed out, within the relatively brief 15-year span of 1970–85:

> We will have made the transition from being an essentially self-sufficient country to—at least in terms of raw materials—a have-not country. We do not yet appreciate the economic, social, and political consequences of this historically abrupt transition.

The most dramatic and threatening development, of course, is the Arab oil embargo, which has the explicit purpose of forcing the United States and its allies in Europe and Japan to change their policies on the Middle East. But this is only the beginning. Other raw material

suppliers, encouraged by the success of the oil embargo, are threatening to play the same game.

Representatives from 16 east and central African countries meeting in Dar-Es-Salaam, Tanzania, on November 24, called for diplomatic economic and other sanctions against the United States, Britain, France, West Germany, Japan and Brazil unless they ceased "support" for white minority regimes in southern Africa. The chairman of the conference, Foreign Minister John W. S. Malecela of Tanzania, said the sanctions could include a ban on both exports to and imports from the United States and the other named countries. Although most of the 16 countries do not possess materials of vital importance to us, some of them such as Zaire, the former Belgian Congo, clearly do.

It should also be emphasized that the Arab countries have already indicated that they intend to use their "oil weapon" for political purposes beyond the Middle East. They are limiting oil shipments to white minority regimes in southern Africa and in the light of the new alliance that is developing between Arab and black African countries the oil weapon may be used to force the United States and its allies to change their policies on African and other issues even after a Middle East settlement has been achieved.

Lest we adopt an unduly self-righteous attitude on these matters, we should recognize frankly that the United States itself has been one of the worst offenders in using trade controls in ways which have adversely affected other countries.

As a result of congressional pressures, we limited trade with countries which gave assistance to Cuba or North Vietnam. Last summer, we unilaterally cut off exports of soybeans and other agricultural products to our trading partners in Europe at the very time that we were pressing them to modify policies of agricultural self-sufficiency and become dependent on our production. And just this week the House of Representatives passed a trade bill which denies most-favored-nation treatment and trade credits to the Soviet Union until they grant free emigration to Soviet citizens.

It is obvious from these examples that the whole concept of an open and cooperative trading system is under serious attack. International trade is becoming heavily "politicized." This trend is destroying the traditions of reasonably free and nondiscriminatory access to markets and supplies that are essential in an increasingly interdependent world.

I have no easy solution to this problem, but I do suggest that we bend every effort to develop some new international rules and procedures to assure equal access to raw materials—to put it more broadly, to recognize the moral and legal imperatives of interdependence.

The present state of international law in this area is most unsatisfactory. I don't have time to summarize all the GATT rules. They are in my prepared statement. But in GATT we have a tangle of rules, exceptions to the rules, and exceptions to the exceptions to the rules, and it is extremely difficult to discern any coherent guidelines for national policy. And, what is more to the point, all of these principles are effectively vitiated by a subsequent GATT article (XXI) which declares that nothing in the GATT shall be construed "to prevent any contracting party from taking any action which it considers necessary for the protection of its essential security in-

terests * * * taken in time of war or other emergency in international relations. * * *" Since we always seem to be in an emergency in international relations, this article is not particularly helpful.

It seems to me that a major U.S. objective in the forthcoming trade negotiations should be to incorporate some new and stronger rules in the GATT limiting the resort to export controls. At a minimum, the new rules shoud prohibit the use of export or other controls for political purposes. A country would not be permitted to cut off or threaten to cut off exports in order to change another country's policies—although latitude might have to be granted to permit countries to restrict the export of weapons and national security information.

The new rules should also seek to define more precisely the economic, conservation and other purposes for which exports can be limited and should place greater emphasis on the need to take account of the interests of others. Most important of all, since the rules on this complex subject will inevitably require interpretation in specific circumstances, new GATT procedures should be created requiring advance notice, consultation, authoritative interpretation of the rules and settlement of disputes by impartial conciliation and arbitration commissions under GATT auspices.

Where countries are found to have violated the new principles and fail to adjust their policies in accordance with multilateral decisions, they should face the possibility of multilateral reprisals. If this cannot be done through the GATT, it may have to be undertaken through the OECD or some other multilateral forum. In extreme situations, multilateral sanctions may even have to be applied to countries that are not GATT members, on the theory that their violation of broadly agreed community standards are gravely threatening community interests.

If we can propose cutting off air service to countries that give refuge to hijackers, if we can contemplate denying port facilities to nations that pollute the oceans with their tankers, we should certainly explore the possibility of multilateral trade, aid and investment embargoes on nations that threaten the world economy by arbitrarily withholding vital raw materials.

I might add quickly that none of the Arab oil producing countries is a party to GATT except for Kuwait and many of the 16 African countries who made the declaration referred to earlier are also outside the GATT.

However, a number of these Arab and African countries which are not GATT members, including Saudi Arabia, have committed themselves in bilateral treaties with us to refrain from the very measures of trade discrimination which they have recently aimed in our direction. So they are violating international law.

Moreover, all of these countries voted for U.N. Resolution 2625 of the 25th General Assembly, entitled "Declaration of Principles of International Law Concerning Friendly Relations and Cooperation Among States in Accordance with the Charter of the United Nations," one of the key principles of which is the following:

> No State may use or encourage the use of economic, political or any other type of measures to coerce another State in order to obtain from it the subordination of the exercise over its sovereign rights and to secure from it advantages of any kind.

It was the Afro-Asian group in the United Nations, including the Arab countries, that pressed hardest for the principle quoted above and for the proposition that this principle was already part of international law. Of course, their motive was to prevent the United States and other industrialized countries from using economic power as an instrument of political pressure. It is interesting that not a single voice has been raised in the United Nations to cite this authoritative declaration of the General Assembly since the Arab oil embargo began.

You can imagine, Mr. Chairman, what the outcry would have been if the United States, Canada and Australia had used their food weapon the way the Arabs are using their oil weapon.

In a speech to the General Assembly in September, Secretary of State Henry Kissinger announced the willingness of the United States to negotiate a new instrument on the "Economic Rights and Duties of States" as proposed by the Government of Mexico. The Department of State has hitherto been reluctant to raise the issue of export embargoes in these negotiations because of our unilateral cutoff of agricultural supplies. I believe the Congress would be serving the enlightened self-interest of our country if it passed a joint resolution calling upon the President as a high priority matter to negotiate in the United Nations and other forums on behalf of equitable and nondiscriminatory access to supplies as well as to markets.

I would also propose a top to bottom review of the pending trade bill known as the "Trade Reform Act of 1973." I have suggested a number of proposed amendments to that bill in our prepared statement. Some of them have already been introduced in the Senate by Senators Mondale and Ribicoff.

Let me make it clear that I am not proposing that we retaliate against the Arab oil-producing countries at this time. We should continue to work through quiet diplomacy for a fair Middle East settlement and the termination of the oil embargo. But the negotiating position of the administration would be strengthened by some carefully drawn amendments to the trade bill and by some carefully prepared multilateral negotiations that put the oil-producing nations and others on notice that they cannot wage economic war upon us with impunity.

We and other OECD countries are dependent on the Arab countries for oil, but they look to the United States and our OECD partners for food, medicines, industrial machinery, consumer goods, military aid, and the technology and management skills of private investors. The Soviet bloc is not in a position to fill the gap completely if the OECD countries cut off these benefits; in any event, countries like Saudi Arabia would think twice about becoming completely dependent on the Communist countries. Thus economic warfare is a game that all can play. Amendments of the trade bill and careful multilateral diplomacy should provide due notice of this fact of life.

In implementing this new international economic policy of access to raw materials, we should act multilaterally, not bilaterally, for at least three reasons. The first is that in most cases a threat of reprisals against raw material cutoffs will have little practical significance unless we have our OECD partners with us.

The second is that unilateral U.S. action will look to others as a destructive act of nationalism unless it is related to multilateral rules and multilateral procedures.

The third is that such an effort of "collective economic security" could degenerate into a North-South economic war unless it is based on principles that are acceptable to a substantial number of developed and developing countries.

In the next several years, the United States and the other industrialized countries, in their enlightened self-interest, should commit themselves to a comprehensive set of new measures to assist the economic development of the developing countries—more multilateral aid, more market access for developing countries' exports, more transfer of technology, a world food reserve, more private investment on mutually satisfactory terms, revenue sharing from seabed exploitation, and the issuance of special drawing rights to multilateral lending agencies. In return, we can reasonably ask that the developing countries assure the international community of reasonable and nondiscriminatory access to raw materials and otherwise support the creation of a cooperative world economic order.

In the international community, as in the nation state, there can be no rights without responsibilities. Our recent neglect of the legitimate interests of our industrialized trading partners and of the developing countries has weakened their commitment to economic cooperation and is beginning to backfire upon us. By giving greater priority to the interests of others, we just might be able to negotiate that general recognition of the obligations of interdependence which is necessary to our survival in an interdependent world. The current disarray in the Atlantic community as well as in the world as a whole will make progress slow and difficult, but we could at least begin.

I would like to add a comment on the very important statement which Mr. Kissinger made yesterday to the Pilgrims in London. This seems to me an excellent beginning in reviving the commitment to interdependence. He proposed a number of steps to revitalize the Atlantic community, and very specifically for cooperation on energy matters.

Perhaps I should just mention them briefly. He called for an energy action group which would take initiatives in four areas:

First, to conserve energy through more rational utilization of existing supplies.

Second, to encourage the discovery and development of new sources of energy.

Third, to give producers an incentive to increase the supply.

And fourth, to coordinate an international program of research to develop new technologies that use energy more efficiently and provide alternatives to petroleum.

He did not specifically propose sharing of the oil itself, but he did make a general commitment that the United States is prepared to make a very major financial and intellectual contribution to the objective of solving the energy problem on a common basis.

It seems to me that this is a very important and indeed historic initiative which looks in the general direction which I have been advocating today.

Thank you.

Chairman REUSS. I might say that those recommendations are substantially identical with those reached by a delegation of the U.S.

Congress and the Parliament of Europe at Strasbourg last May, almost word for word. And I agree, it is a good beginning.

[The prepared statement of Mr. Gardner follows:]

PREPARED STATEMENT OF RICHARD N. GARDNER [1]

I am grateful for your invitation to testify in these hearings on "The Economic Impact of Petroleum Shortages." In accordance with your request, I shall concentrate on the implications of the Arab oil embargo for United States foreign economic policy.

In August 1941, Franklin Roosevelt and Winston Churchill met on a destroyer off Newfoundland to draft the Atlantic Charter, a statement of postwar aims which could unite freedom-loving people everywhere in the fight against facism. The fourth paragraph of the Charter proclaimed the principle of "access, on equal terms, to the trade and to the raw materials of the world."

The motivation behind the fourth paragraph of the Atlantic Charter was simple. The leaders of the wartime alliance believe that peace could not be achieved unless it had a sound economic basis. The experience of the first four decades of this century suggested that if countries were denied access to raw materials and markets, they might be tempted to secure them by resort to force—or at least would seek to justify aggression on the grounds that they were denied the opportunity to meet their economic requirements through peaceful means.

Cordell Hull, the father of the trade agreements program, was a believer in the theory that "if goods can't cross borders, armies will." This perception of the close relation between economic policies and peace had a profound influence not only on the Atlantic Charter but on other wartime statements and no postwar planning.

Yet despite this background, international economic negotiations from the end of the Second World War to the present time have focused almost entirely on access to markets and have virtually ignored the problem of access to supplies. The reason for this one-sided emphasis is obvious—for most of the postwar period the central problem seemed to be how to avoid depression and unemployment by selling goods to other countries. Now, however, we are moving into an era of resource scarcity and accelerating inflation—an era which requires a new approach to international economic policy, or perhaps we should say a return to the old and forgotten perceptions which lay behind the fourth paragraph of the Atlantic Charter.

Raw material access has acquired a new importance for the United States. By 1985 our country, even if it achieves energy self-sufficiency, will be primarily dependent on imports for nine of the thirteen basic minerals required by a modern industrial economy. As Lester Brown has pointed out, within the relatively brief fifteen year span of 1970–1985, "we will have made the transition from being an essentially self-sufficient country to—at least in terms of raw materials—a have-not country. We do not yet appreciate the economic, social, and political consequences of this historically abrupt transition."

The most dramatic and threatening development, of course, is the Arab oil embargo, which has the explicit purpose of forcing the United States and its allies in Europe and Japan to change their policies on the Middle East. But this is only the beginning. Other raw material suppliers, encouraged by the success of the oil embargo, are threatening to play the same game. Representatives from 16 East and Central African countries meeting in Dar-Es-Salaam, Tanzania on November 24, called for diplomatic economic and other sanctions against the United States, Britain, France, West Germany, Japan and Brazil unless they ceased "support" for white minority regimes in Southern Africa. The Chairman of the conference, Foreign Minister John W. S. Malecela of Tanzania, said the sanctions could include a ban on both exports to and imports from the United States and the other named countries. Although most of the sixteen countries do not possess materials of vital importance to us, some of them, such as Zaire, the former Belgian Congo, clearly do.

It should also be emphasized that the Arab countries have already indicated that they intend to use their "oil weapon" for political purposes beyond the

[1] Richard N. Gardner is Professor of Law and International Organization at Columbia University. He was Deputy Assistant Secretary of State for International Organization Affairs in the Kennedy Administration and was a member of President Nixon's Commission on International Trade and Investment Policy.

Middle East. They are limiting oil shipments to white minority regimes in Southern Africa and in the light of the new alliance that is developing between Arab and black African countries the oil weapon may be used to force the United States and its allies to change their policies on African and other issues even after a Middle East settlement has been achieved.

Lest we adopt an unduly self-righteous attitude on these matters, we should recognize frankly that the United States itself has been one of the worst offenders in using trade controls in ways which have adversely affected other countries. As a result of Congressional pressures, we limited trade with countries which gave assistance to Cuba or North Viet Nam. Last summer, we unilaterally cut off exports of soybeans and other agricultural products to our trading partners in Europe at the very time that we were pressing them to modify policies of agricultural self-sufficiency and become dependent on our production. And just this week the House of Representatives passed a trade bill which denies most-favored-nation treatment and trade credits to the Soviet Union until they grant free emigration to Soviet citizens.

It is obvious from these examples that the whole concept of an open and co-operative trading system is under serious attack. International trade is becoming heavily "politicized." This trend is destroying the traditions of reasonably free and non-discriminatory access to markets and supplies that are essential in an increasingly interdependent world.

Since the U.N. Charter, countries are no longer permitted to use force to back up their economic claims. Quite apart from legal prohibition, such actions now entail costs and risks that make them politically undesirable. But if the Atlantic Charter concept of equal access to raw materials cannot be guaranteed by the use of force, we need to consider guaranteeing it in some other way.

I have no easy solution to this prolem, but I do suggest that we bend every effort to develop some new international rules and procedures to assure equal access to raw materials. The present state of international law in this area is most unsatisfactory. The General Agreement on Tariffs and Trade does contain a general prohibition on the use of export and import controls (Article XI) as well as a requirement that both export and import controls should not discriminate between countries (Article I). Article XX of GATT permits measures deviating from these and other GATT rules "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption." The same article also permits measures "essential to the acquisition or distribution of products in general or local short supply: *Provided* that any such measures shall be consistent with the principle that all contracting parties are entitled to an equitable share of the international supply of such products. . . ." These authorizations of export restrictions are subject to the requirement that such measures "are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or disguised restrictions on international trade. . . ."

In this tangle of rules, exceptions to the rules, and exceptions to the exceptions to the rules, it is extremely difficult to discern any coherent guidelines for national policy. And, what is more to the point, all of these principles are effectively vitiated by a subsequent GATT article (XXI) which declares that nothing in the GATT shall be construed "to prevent any contracting party from taking any action which it considers necessary for the protection of its essential security interests . . . taken in time of war or other emergency in international relations. . . ."

It seems to me that a major U.S. objective in the forthcoming trade negotiations should be to incorporate some new and stronger rules in the GATT limiting the resort to export controls. At a minimum, the new rules should prohibit the use of export or other controls for political purposes. A country would not be permitted to cut off or threaten to cut off exports in order to changes another country's policies (although latitude might have to be granted to permit countries to restrict the export of weapons and national security information). The new rules should also seek to define more precisely the economic, conservation and other purposes for which exports can be limited and should place greater emphasis on the need to take account of the interests of others. Most important of all, since the rules on this complex subject will inevitably require interpretation in specific circumstances, new GATT procedures should be created requiring advance notice, consultation, authoritative inter-

pretation of the rules and settlement of disputes by impartial conciliation and arbitration commissions under GATT auspices.

Where countries are found to have violated the new principles and fail to adjust their policies in accordance with multilateral decisions, they should face the possibility of multilateral reprisals. If this cannot be done through the GATT, it may have to be undertaken through the OECD or some other multilateral forum. In extreme situations, multilateral sanctions may even have to be applied to countries that are not GATT members, on the theory that their violation of broadly agreed community standards are gravely threatening community interests. If we can propose cutting off air service to countries that give refuge to hijackers, if we can contemplate denying port facilities to nations that pollute the oceans with their tankers, we should certainly explore the possibility of multilateral trade, aid and investment embargoes on nations that threaten the world economy by arbitrarily withholding vital raw materials.

It may be useful to note at this point that none of the Arab oil producing countries is a party to GATT except for Kuwait and many of the sixteen African countries who made the declaration referred to earlier are also outside the GATT. However, a number of these Arab and African countries who are not GATT members (including Saudi Arabia) have committed themselves in bilateral treaties with us to refrain from the very measures of trade discrimination which they have recently aimed in our direction. Moreover, all of these countries voted for U.N. Resolution 2625 of the 25th General Assembly, entitled "Declaration of Principles of International Law Concerning Friendly Relations and Cooperation Among States in Accordance with the Charter of the United Nations." In promulgating this resolution, the General Assembly declared that "the principles of the Charter which are embodied in this Declaration constitute basic principles of international law, and consequently appeals to all States to be guided by these principles in their international conduct and to develop their mutual relations on the basis of their strict observance."

One of the key principles of the Declaration is the following: "No State may use or encourage the use of economic, political or any other type of measures to coerce another State in order to obtain from it the subordination of the exercise over its sovereign rights and to secure from it advantages of any kind."

It was the Afro-Asian group in the United Nations, including the Arab countries, that pressed hardest for the principle quoted above and for the proposition that this principle was already part of international law. Of course, their motive was to prevent the United States and other industrialized countries from using economic power as an instrument of political pressure. It is interesting that not a single voice has been raised in the United Nations to cite this authoritative declaration of the General Assembly since the Arab oil embargo began.

In his speech to the General Assembly in September, Secretary of State Henry Kissinger announced the willingness of the United States to negotiate a new instrument on the "Economic Rights and Duties of States" as proposed by the Government of Mexico. The Department of State has hitherto been reluctant to raise the issue of export embargoes in these negotiations because of our unilateral cut-off of agricultural supplies. I believe the Congress would be serving the enlightened self-interest of our country if it passed a joint resolution calling upon the President as a high priority matter to negotiate in the United Nations and other forums on behalf of equitable and non-discriminatory access to supplies as well as to markets.

I would also propose a top to bottom review of the pending trade bill known as the "Trade Reform Act of 1973." To promote our own and the general world interest in access to supplies, we should consider amendments to the bill which would:

Declare that access to supplies as well as access to markets is a major purpose of the new legislation,

Direct the President to negotiate improved rules and procedures in GATT and other international agreements covering export restrictions,

Direct the President to negotiate procedures for multilateral sanctions through GATT or other international agreements against countries that injure the international community by unjustifiable export controls,

Provide specific authority to the President to retaliate against such restrictions through U.S. export or import controls, the denial and economic and military aid, and the prohibition of credits and foreign investment,

Authorize the granting of adjustment assistance to workers and firms which are adversely affected by the denial of imports as well as by an increase in imports.

I understand that Senator Mondale, with the support of Senator Ribicoff, has already introduced some of the amendments suggested above in the United States Senate.

Let me make it clear that I am not proposing that we retaliate against the Arab oil-producing countries at this time. We should continue to work through quiet diplomacy for a fair Middle East settlement and the termination of the oil embargo. But the negotiating position of the Administration would be strengthened by some carefully drawn amendments to the trade bill and by some carefully-prepared multilateral negotiations that put the oil-producing nations and others on notice that they cannot wage economic war upon us with impunity.

We and other OECD countries are dependent on the Arab countries for oil, but they look to the U.S. and our OECD partners for food, medicines, industrial machinery, consumer goods, military aid, and the technology and management skills of private investors. The Soviet bloc is not in a position to fill the gap completely if the OECD countries cut off these benefits; in any event, countries like Saudi Arabia would think twice about becoming completely dependent on the Communist countries. Thus economic warfare is a game that all can play. Amendments of the trade bill and careful multilateral diplomacy should provide due notice of this fact of life.

In implementing this new international economic policy of access to raw materials, we should act multilaterally, not bilaterally, for at least three reasons. The first is that in most cases a threat of reprisals against raw materials cutoffs will have little practical significance unless we have our OECD partners with us. The second is that unilateral U.S. action will look to others as a destructive act of nationalism unless it is related to multilateral rules and multilateral procedures. The third is that such an effort of "collective economic security" could degenerate into a North-South economic war unless it is based on principles that are acceptable to a substantial number of developed and developing countries.

In the next several years, the United States and the other industrialized countries, in their enlightened self-interest, should commit themselves to a comprehensive set of new measures to assist the economic development of the developing countries—more multilateral aid, more market access for developing counties' exports, more transfer of technology, a world food reserve, more private investment on mutually satisfactory terms, revenue-sharing from seabed exploitation, and the issuance of special drawing rights to multilateral lending agencies. In return, we can reasonably ask that the developing countries assure the international community of reasonable and non-discriminatory access to raw materials and otherwise support the creation of a cooperative world economic order.

In the international community, as in the nation state, there can be no rights without responsibilities. Our recent neglect of the legitimate interests of our industrialized trading partners and of the developing countries has weakened their commitment to economic cooperation and is beginning to backfire upon us. By giving greater priority to the interests of others, we just might be able to negotiate the kind of "world order bargain" necessary to our survival in an interdependent world. The current disarray in the Atlantic community as well as in the world as a whole will make progress slow and difficult, but we could at least begin.

Chairman REUSS. Please proceed, Mr. Saxonhouse.

STATEMENT OF GARY R. SAXONHOUSE, PROFESSOR OF ECONOMICS, UNIVERSITY OF MICHIGAN

Mr. SAXONHOUSE. Mr. Chairman, today the Japanese economy suddenly seems uniquely vulnerable because of its heavy dependence on imports for its energy supplies. Fully 85 percent of Japanese energy supplies are imported; 72 percent of Japanese energy is imported oil. Among the industrialized nations of the world, only Italy and France approach the quantity and quality of Japan's dependence.

At the same time, when the 25-percent cutback from the September 1973 output levels was announced by the Arab oil producers, it was initially assumed that the consequences of this cutback would be mild

for Japan by comparison with some western European nations, or even the United States. Because of heavy Japanese reliance on Iranian oil only 41 percent of Japan's oil comes from those Arab oil producers observing the cutback. By comparison, 63 percent of the Italian oil supply, and 67 percent of the Dutch oil supply, and 75 percent of the West German oil supply, comes from these Arab sources.

The first Japanese Government discussions this fall assumed that Japan would simply be deprived of 25 percent of its Arab oil supply. The total supply shortfall would be no more than 10 percent. This mechanical estimate was clearly too optimistic. No allowance was made for the continuously increasing energy needs of the Japanese economy. A later estimate by the Government put the shortfall at 17 percent of planned supply, and in mid-November the Petroleum Association of Japan presented what at first blush appeared to be the incredible estimate of a 25-percent shortfall for the last half of the current Japanese fiscal year. Notice that both these estimates, but particularly the trade association estimate, must assume some diversion of non-Arab oil once destined for Japan.

Indeed, the trade association estimates assume 33- to 36-percent cutbacks from planned imports from the entire Mideast during the period December 1973 through March 1974. If correct, this means the very substantial diversion of from 25 to 35 percent of Japan's Iranian oil supply. The estimate also implicitly assumes a 15-percent diversion of non-Mideast oil from Japan.

Are diversions of this magnitude credible? Seventy-five percent of all crude oil deliveries to Japan are made by the major international oil companies. Most of these companies have announced cutbacks in shipments to Japan. The aggregate publicly announced cutbacks, however, do not approach the estimate prepared by the Petroleum Association of Japan.

Whether these diversions are or will be taking place is the nub of Japan's current oil supply situation. If they are not taking place, then Japan's oil shortfall is not so very different from the U.S. situation, or from the situation that is common in some western European countries. If they are taking place, I think there is a policy issue here of some importance. I will return to this at the conclusion of my statement.

In projecting the impact of the Arab cutback on the Japanese economy it should be understood that part of the shortfall between imports and projected consumption of petroleum products can be made up by stockpiles currently in Japan. It was previously projected that on December 1 Japanese oil stockpiles would be equivalent to 57 days' consumption. In the presence of such stockpiles it is unlikely that the shortfall in consumption during the next Japanese fiscal year will be greater than 15 percent of originally projected consumption.

Of course, with less diversion and a change in Arab oil policies the shortfall could be considerably smaller than this amount.

It was previously stated that with the exception of Italy and perhaps France, Japan maintains an unusually heavy reliance on oil in its total energy consumption. Compared with other nations it is also true that an unusually large proportion of Japan's total available energy is directly consumed in its industrial sector. In 1970, 57.5 percent of total available energy in Japan was consumed in the industrial

sector, while 23 percent of the available energy was consumed in the household sector. By contrast, in both the United States and the United Kingdom approximately 35 percent of the available energy supply was consumed in each of those sectors respectively. There is nothing particularly sinister at work here. Climate and the relatively large proportion of Japanese GNP originating in the manufacturing center account for most of this variation. Italy, again, has much in common with the Japanese case. Nearly half of the Italian energy supply is consumed in the industrial sector, while less than 30 percent of the energy finds its way to the household sector. All this means that proportional cutbacks across sectors of energy available will leave relatively more industrial equipment idle in Japan and Italy.

In the United States proportionately more central heating systems, and more recreational vehicles, and more light bulbs will be operating below full capacity. While the relative welfare consequences of this are always arguable, by most conventional indexes the consequences seem less serious for the United States. Of course, cutbacks need not be strictly proportional. By careful management economic disruption could be minimized. The slack which must be economized on is typically presumed to be found in the nonindustrial sectors of the economy. To the extent that these sectors are proportionately smaller in Japan than elsewhere, this suggests that opportunities for economizing are also less. Of course, size isn't everything, and so unusual opportunities for cutbacks do exist in Japan. Japan has no Los Angeles. While private automobile ownership has increased remarkably in the last 10 years, Japan's excellent mass transit system does make the automobile somewhat superfluous. Notwithstanding this potential ray of sunshine, the Japanese Government has for some weeks now recognized the inevitable, and has been moving to implement a 10-percent cut in the energy made available to the 12 major industries which are, relatively speaking, the heaviest consumers of energy.

Among these 12 industries are the steel, automobile, and shipbuilding industries.

If the structure of Japan's energy relationships suggests serious difficulties, one still looks for more precise quantitative handles.

In the month and a half since the nature of the Arab cutback became known, forecasters working in Tokyo have not hesitated to present estimates of the future course of the Japanese economy. The consensus of these estimates seems to be that with the actual consumption of petroleum products 10 to 15 percent below the originally projected consumption level, the real rate of growth of the Japanese economy for the next fiscal year will be zero, or might decline by as much as 5 percent. Private plant and equipment investment will drop sharply and an already high rate of inflation will accelerate.

Still more pessimistic forecasts could be generated if the Petroleum Association of Japan's oil supply outlook is taken seriously and extrapolated through the next Japanese fiscal year. The decline in Japanese GNP might go as high as 10 percent. One can handily minimize the consequences of 5- or 10-percent declines in the GNP, however small the probability of their occurring might be. One has to go back 25 years to the postwar reconversion period of both the United States and Japan to find domestic dislocations comparable in magnitude. Even those experiences do not stand close comparison. The whole fabric

of postwar Japanese business practice, the highly leveraged capital structure of large corporations, and the so-called permanent employment system, to cite two well-known examples, are intimately connected with Japanese rapid real growth. The adjustment process for Japanese business in circumstances of very low or negative real GNP growth will surely be most difficult.

Before proceeding I should probably return to what I can well imagine must be a familiar refrain throughout these hearings. These aggregate forecasts should not be taken too seriously. Even if the petroleum supply input into the forecast models are correct—and there are some reasons for believing that for the next Japanese fiscal year the forecasts are too pessimistic—Japanese forecasters, as their American counterparts, presumably, have very limited experience in short-term, macroeconomic forecasting under the constraint of energy shortage. One suspects that the way in which energy variables are introduced into these forecasting models will undergo increasing sophistication in the coming months.

Be that as it may, it is still fair to ask what impact the potential deterioration or slowdown in the Japanese economy might have on United States-Japan economic relations, and in particular on the $15 billion overseas trade between the two countries. During the years of very large and growing bilateral imbalance between Japan and the United States, it was continuously demonstrated that U.S. exports to Japan were relatively income inelastic. This is hardly surprising when roughly 70 percent of American exports to Japan are agricultural and nonagricultural raw materials. Income inelasticity hurts when your trade partner is growing very rapidly. But in the event of a slowdown, the negative impact is buffered. In any event, given the current supply and demand relationships in these American industries, it is hard to imagine that a decline in Japanese demand is an unhappy consequence for this country.

Insofar as imports from Japan are concerned, one sees little cause for major alarm, though it is regrettable that the American consumer will no longer be able to look to Japan as a source of high quality products whose low prices help to dampen our own domestic inflation. Fully 50 percent of the Japanese exports to the United States are being produced in industries whose energy supplies are being tightly constrained by the Japanese Government. This being the case, it is questionable whether even the Japanese small car manufacturers will be able to take full advantage of the new opportunities available in the American market.

If I am correct in doubting that a Japanese calamity, if it does occur, in isolation from other developments, will have serious economic consequences for this country, is there anything the United States should be doing to help prevent the deterioration of the Japanese economy? I do not believe it would be wise to divert to Japan on a bilateral basis oil that would otherwise be shipped to this country. Such a diversion would only be wise as part of a multilateral pooling arrangement taken with the full cooperation of the West European countries. Any bilateral United States-Japan arrangement would expose Japan to the Arab nations as a lever from which pressure could be exerted on the United States.

What the United States should do, however, is to insure that the oil which Japan is entitled to under the constraint of the Arab cut-

back is not diverted to the United States, as has already been done in the case of some Indonesian oil, or to any other country whose energy shortage appears less severe than the difficulties Japan now faces. The legitimacy of any diversion by the administrative fiat of an international oil company must be in question. The possibility that almost 10 percent of Japan's energy supply may be diverted on this basis seems unthinkable. To date there can be no hard evidence that the estimate of the Petroleum Association of Japan is correct. If the estimate proves correct, and if done without the acquiescence of the Japanese Government, diversion of oil meant for Japan by the actions of the American-managed companies hardly seems consonant with the long-term interests of the United States. Rightly or wrongly, by such actions multinational corporations everywhere seem in danger of being indelibly tainted as partisans of narrow home country interests at whatever cost to the host countries. More concretely, such actions only further serve to accelerate Japanese competition with other oil-consuming nations for participation in new producers' projects in the Mideast and elsewhere at just the time when more cooperation among oil consumer countries and less participation in production might very well be the sensible order of the day.

Thank you.

[The prepared statement of Mr. Saxonhouse follows:]

PREPARED STATEMENT OF GARY R. SAXONHOUSE

Mr. Chairman, as recently as eight months ago, it would have been quite typical for your Subcommittee to have held hearings on the international consequences of Japan's very large, open and very rapidly growing economy. Had such hearings been held, the Japanese economy might have been characterized as a serious menace to American markets and jobs. Again Japan might have been singled out as a prime culprit in the destruction of the post-war international financial system. Eight months ago, large, influential segments of American public opinion held that the remarkable, rapidly increasing efficiency and capability of the hard-working Japanese people, and the consequent threats posed, presented the Western economic system with a worrisome, source of instability. The popular press presents a rather different picture today. Japan is a dinosaur, a pitiful, helpless giant. Japan flourished in the very special conditions of the first twenty-five post-war years. The liberal, international commercial and financial norms which were once very widely shared, were virtually indispensable in Japan's rapid recovery and development. Whether these norms can ever be so widely shaped remains suspect. This new American pessimism regarding Japan is vividly reflected in the American foreign exchange and equity markets. In Chicago, yen for future delivery are being sold at a heavy discount from their spot value. In New York, listed Japanese securities are being sold at even heavier discounts from their real asset value. In evaluating the seriousness of this new crisis this rapid turnabout in public opinion should not be ignored.

On the surface, Japan suddenly seems uniquely vulnerable because of its heavy dependence on imports for its energy supply. Fully 85.0% of Japanese energy supplies are imported. 72% of Japanese energy is imported oil. Among the industrialized nations of the world only Italy and France approach the quantity and quality of Japan's dependence. At the same time, when the 25% cutback from the September 1973 output levels, together with the Netherlands and American embargo, was announced by the Arab oil producers, it was initially assumed that the consequences of this cutback would be mild for Japan by comparison with some Western European nations or even the United States. Because of heavy Japanese reliance on Iranian oil only 41% of Japan's oil comes from those Arab oil producers observing the cutback. By comparison, 63% of the Italian oil supply, 67% of the Dutch oil supply and 70% of the West German oil supply comes from these Arab sources. The first Japanese government discussions assumed that Japan would simply be deprived of 25% of its Arab oil supply. The supply shortfall would be no more than 10%. This mechanical estimate was

clearly too optimistic. No allowance was made for the continuously increasing energy needs of the Japanese economy. A later estimate by the government put the shortfall at 17% of planned supply, and in mid-November the Petroleum Association of Japan estimated the shortfall as high as 23%. Both these estimates refer to the last half of the current Japanese fiscal year. Again, both these estimates, but particularly the trade association estimate, must assume some diversion of non-Arab oil once destined for Japan. Indeed, the trade association estimates assume 33%–36% cutbacks from planned imports for the entire Mid-East during the period December 1973 through March 1974.

If correct, this means very substantial diversion (25%–35%) from Japan to Iranian oil. The estimate also implicitly assumes a 15% diversion of non-Mid-East oil from Japan. Are diversions of this magnitude credible? 75% of all crude oil deliveries to Japanese are made by the major international oil companies. Most of these companies have announced cutbacks in shipments to Japan. The aggregate publicly announced cutbacks, however, do not approach the estimates prepared by the Petroleum Association of Japan.

In projecting the impact of the Arab cutback on the Japanese economy, it should be understood that part of the shortfall between imports and projected consumption of petroleum products can be made up by stockpiles currently in Japan. It was previously projected that on December 1 Japanese oil stockpiles would be equivalent to fifty-seven days consumption. In the presence of such stockpiles it is unlikely that the shortfall in consumption during the next Japanese fiscal year will be greater than 15% of originally projected consumption. Of course, with less diversion and a change in Arab oil policies the shortfall would be considerably smaller than this amount.

It was previously stated that with the exception of Italy and perhaps France, Japan has an unusually heavy reliance on oil in its total energy consumption. Cross-nationally an unusually large proportion of Japan's total available energy is consumed in the household sector. In 1970, 57.5% of total available energy in Japan was consumed in the industrial sector, while 23% of the available energy was consumed in the household sector. By contrast, in both the United States and the United Kingdom approximately 35% of the available energy supply was consumed in each of these sectors respectively. There is nothing particularly sinister at work here.

Climate and the relatively large proportion of Japanese GNP originating in the manufacturing sector account for most of the variation. Italy, again, has much in common with the Japanese case. Nearly half of the Italian energy supply is consumed in the industrial sector while less than 30% of the energy finds its way to the household sector. This means that equiproportionate cutbacks across sectors of energy available will leave proportionately more industrial equipment idle in Japan and Italy. In the United States, proportionately more central heating systems, more recreational vehicles, and more light bulbs will be operating below full capacity. While the relative welfare consequences of this are always arguable, by most conventional indices the consequences seem less serious for the United States. Of course, cutbacks need not be strictly proportional. By careful management economic disruption could be minimized. The slack which must be economized is typically presumed to be found in the non-industrial sectors of the economy. To the extent that these sectors are proportionately smaller in Japan than elsewhere, this suggests that opportunities for economizing are also less. Of course, size isn't everything and some unusual opportunities for cutbacks do exist in Japan. Japan has no Los Angeles. While private automobile ownership has increased remarkably in the last ten years in Japan, Japan's excellent mass transit system does make the automobile somewhat superfluous. Notwithstanding this potential ray of sunshine, the Japanese have for some weeks now recognized the inevitable and have been moving to implement a 10% cut in the energy made available to the twelve major industries which are relatively the heaviest consumers of energy. Among these twelve industries are steel, automobile and shipbuilding industries.

If the structure of Japan's energy relationships suggest serious difficulties, one still looks for more precise quantitative handles. In the month and one half since the nature of the Arab cutback became known, forecasters working in Tokyo have not hesitated to present estimates of the future course of the Japanese economy. The consensus of these estimates must be that with an actual consumption of petroleum products 10%–15% below the originally projected consumption the real rate of growth of the Japanese economy for the next fiscal year will be zero or might decline by as much as 5%. Private plant and equipment investment will drop sharply and an already high rate of inflation will accelerate. The

special reduced form equations for at least one of the better known Japanese forecasting models can be inferred and if one extrapolates the Petroleum Association of Japan's pessimistic outlook for the entire fiscal 1974 and if one assumes that the Japanese authorities will be unwilling to completely draw down Japanese stockpiles for whatever reason during the next year, then the decline in Japanese GNP could be put as high as 10%. One can hardly minimize the consequences of 5% or 10% declines in the GNP. One has to go back twenty-five years to post-war reconversion periods of both the United States and Japan to find dislocations comparable in magnitude. Even those experiences are hardly comparable. The whole fabric of Japanese business practice, the highly-leveraged capital structure of large corporations and the so-called permanent employment system, to cite two well-known examples, are more than likely artifacts of Japanese rapid real growth. The adjustment process of Japanese business, may be most difficult.

Before proceeding I should probably return to what I can well imagine must be a familiar refrain throughout these hearings. These aggregate forecasts should not be taken too seriously. Even if the petroleum supply input into the model is correct (and there are some reasons for believing the forecasts to be too pessimistic), Japanese forecasters (as their American counterparts, presumably) have very limited expreience in short term macro-economic forecasting under the constraint of energy-shortage induced excess capacity. One suspects that the way which energy is entered into these forecasting models will undergo increasing sophistication in the coming months.

Be that as it may, it is still fair to ask what impact the potential deterioration or slowdown of the Japanese economy might have on U.S.-Japan economic relations and in particular on the $15 billion overseas trade between the two countries. During the years of the very large and bilateral trade deficit between Japan and the United States, it was continuously demonstrated that U.S. exports to Japan were relatively income inelastic. This is hardly surprising when roughly seventy percent of American exports to Japan are agricultural and non-agricultural materials. Income inelastically hurts when your trade partner is growing very rapidly, but in the event of slowdown the negative impact is buffered. In any event, given the current supply-demand relationships in these industries, it is hard to imagine that a decline in demand is socially deleterious.

In so far as imports from Japan are concerned, one sees little cause for major concern, though it is regrettable that the American consumer will no longer be able to look to Japan as a source of high quality products whose low prices help to dampen domestic inflation. Fully 50% of the Japanese exports to the United States are being produced in industries whose energy supplies are being tightly constrained by the government. This being the case, it is questionable whether even the Japanese small-car manufacturers will be able to take full advantage of the new opportunities available in the American market.

If I am correct in doubting that a Japanese calamity, if it does occur, in isolation from other developments, will have serious economic consequences for this country, is there anything the United States should do to help prevent the deterioration of the Japanese economy? I do not believe it would be wise to divert to Japan on a bilateral basis oil that would otherwise be shipped to this country. Such a diversion would only be wise as part of a multilateral pooling arrangement taken with the full cooperation of the West European countries.

Any bilateral U.S.-Japan arrangement would expose Japan to the Arab nations as a lever from which pressure could be exerted in the United States. What the United States should do, however, is to ensure that oil which Japan is entitled to under the constraint of the Arab cutback is not diverted to the United States, as has already been done in the case of some Indonesian oil, or to any other country whose energy shortage appears less severe than Japanese problems. The legitimacy of any diversion by the administrative fiat of an international oil company must be in question. The possibility that almost 10% of Japan's energy supply may be diverted seems unthinkable. To date there can be no hard evidence that the estimate of the Petroleum Association of Japan is correct. If the estimate proves correct, and if done without the acquiescence of the Japanese government, diversion of oil meant for Japan by the actions of American managed companies hardly seems consonant with the long term interests of the United States. Rightly or wrongly, the multinational corporation seems in danger of being indelibly tainted as a partisan of narrow home country interests at whatever cost to the host country. More concretely, such actions only further serve to accelerate Japanese competi-

tion with other consuming nations for participation in new producers' projects in the Mid-East and elsewhere at just the time when more cooperation among all consumer countries and less participation in production might very well be the sensible order of the day.

Chairman REUSS. Thank you very much, Mr. Saxonhouse.

We will now hear from Mr. Michel Vaillaud.

STATEMENT OF MICHEL VAILLAUD, EXECUTIVE VICE PRESIDENT, SCHLUMBERGER, LTD.

Mr. VAILLAUD. Thank you.

I would like to express my gratitude to the Joint Economic Committee for giving me the opportunity to testify on energy matters during the present hearings of the Subcommittee on International Economics.

SOME BASIC CONSIDERATIONS OF THE PRESENT ENERGY SITUATION

I would draw your attention to the fact that I have very recently left the Oil and Gas Department of the French Government and I am therefore obliged to observe a certain discretion in affairs related to oil. However, the possibly very damaging effects of the present energy situation on the economies of the world and its very different impact on the American and on the European economies, led me to accept your kind invitation to address you with the following comments.

A prepared statement has been given to you which tries to stress certain important features of the present situation.

I do not intend to make a detailed presentation of this prepared statement but I will be glad to answer any questions you may wish to raise on this document. The following is a summary.

A fundamental cause of our present difficulties—at least as important as the consequences of the current upsurge of the Israel-Arab conflict—is the difficulty of adjusting the long term balance between supply and demand. In the absence of drastic change in both consuming habits and source of supply, the world economy will be unable to face the continuing increase in demand due to the population growth already in progress and to the necessity for a continuous improvement in the conditions of life of the less favored.

In the absence of such a change, oil supply would have to reach at least 200 million barrels per day in the year 2000.

Even in 1985 imports to Europe and the United States may have to go as high as 27 and 17 million barrels per day, respectively. The Middle East reserves would be just sufficient to achieve such an important program: This would bring the production of that region well above 50 million barrels per day or would represent more than 25 percent of total world energy supply. This seems unlikely to be achieved but solutions for the long term exist.

Increase the rate of construction of nuclear plants, reduce the delay of having them put into operation, switch to electric heating of houses and plants.

Increase coal production, mainly in the United States.

Develop R. & D. program that will give new technology for production of liquid and gaseous hydrocarbons from coal.

Make unprecedented efforts to locate offshore oil on Continental Shelves, deep gas in the United States and deep sea oil and gas around Europe.

None of these measures is likely to produce any real effect for several years—the first favorable changes may come from North Sea production which will rise rapidly to 3 million barrels per day from opening up the Alaska North Slope for production and from U.S. coal production.

It will take at least 10 years to produce a more satisfactory situation.

Let us turn now to the more immediate problems; that is, the effects of the Arab embargo during the winter 1973–74 on the economies of different countries, mainly in the United States and Europe.

According to the most reliable estimates it seems that the reduction of supply in that period will be of the order of 6 million barrels per day or a little more, of which 1.9 million barrels per day will be for the United States, both for direct crude imports and for products imported from the Caribbean and European refineries; 2.3 million barrels per day will be for Europe; 0.9 million barrels per day for Japan; and 0.95 million barrels per day for the rest of the world.

The primary effects of these cuts are widely different, according to the importance of domestic oil production and of other sources of energy.

Here I show the effect of cuts in oil imports on oil supply and energy consumption.

The United States, for a cut of 30 percent of oil imports, 11 percent of oil supply, and 5 percent of energy consumption.

Europe, for a cut of 15 percent of oil imports, 15 percent of oil supply, and 10 percent of energy consumption.

Japan, for a cut of oil imports of 18 percent, 18 percent of oil supply, and 14 percent of energy consumption.

Then the total embargo on both direct and indirect imports to the United States has a far less serious impact on total energy supply in this country compared to the reduced and sometimes "friendly" limitations of oil shipments to Europe or Japan.

Moreover, this impression is reinforced by the very different abilities of these three economic entities to reduce leisure and comfort consumption: In that sense the effect of any reduction of gasoline consumption will make a far greater contribution to restoring the balance in the United States compared to Europe.

Some figures are given in the prepared statement, which show how different the gasoline consumption in the United States, Europe, and Japan is.

So considering the relatively limited reduction of the U.S. supply and the feasibility of an acceptable reduction in gasoline consumption, and in the level of home and plant heating, no reduction in industrial activity should be feared.

We must, however, keep in mind that, as the U.S. economy is in the process of developing very fast its oil imports, mainly from the Middle East, the situation may, in fact, be more difficult in the next 2 years than during this winter.

Further, I should also point out that the negative effect of the crisis on the car industry and on the industries tied to the uses of cars, may be more than compensated for by the production resulting from the investment in coal mines, nuclear plants, and increased exploration for petroleum. Even the necessity to adapt the assembly lines to the production of smaller cars may represent an additional activity.

The prospects for Europe and Japan are completely different. The reduction of supply ranges from a level of 11 to 15 percent; a decrease in gasoline consumption and heating oil uses is unlikely to be sufficient to meet such a reduction. It seems that, in these circumstances, reserve stocks will have to be used to a very large extent and that at least an absence of economic growth must be forecast for the year 1974, with the exception of France—whose stock position and supply situation may be more favorable, mainly stock position.

So the immediate effects of the oil embargo will be absorbed more easily by the American economy than by the European and Japanese economies. Incidentally, this conclusion is reinforced by the widely different consequences of the recent increase in oil prices: Europe, which imports nearly all of its oil supply, will face a supplementary import bill of at least $10 billion; the United States, whose domestic production still accounts for more than 60 percent of their total oil supply, will pay considerably less.

But the present crisis might also be a necessary, and in the long run, beneficial factor in awakening public opinion all over the world. As far as I know, many Government officials and oil company executives were well aware of the coming difficulties in the world of energy. But, in many cases, it appeared impossible to overcome the skepticism of those who, also with some real justification, have fought to maintain a certain concept of the way of life, and to protect the environment.

The Arab embargo on oil is likely to bring very different consequences to the United States and to Europe and Japan. This will be my conclusion. It may be an occasion for renewed strength of the American economy; the United States has the natural and technical resources to surmount the present situation and is now faced with the kind of challenge which it has always overcome in the past.

On the other hand, even if Europe and Japan move very confidently to a large nuclear effort and unprecedented development of petroleum exploration, this crisis would have emphasized their fundamental weakness—the absence of a significant domestic energy supply.

This enforced awakening may, however, hasten in Europe the move toward political unity.

Thank you.

[The prepared statement of Mr. Vaillaud follows:]

PREPARED STATEMENT OF MICHEL VAILLAUD

SOME BASIC CONSIDERATIONS OF THE PRESENT ENERGY SITUATION

First, we must keep in mind the difficulties we are facing to-day are part of a continuing situation—the extreme difficulty in achieving a satisfactory balance between supply and demand for energy until the end of the present century, or at least until 1985.

Here are some figures concerning that balance:

The total world demand for oil as a source of energy is expected to double every fifteen years, increasing from 101 MB/D oil equivalent in 1970 to 210 MB/D oil equivalent in 1985 and 400 MB/D oil equivalent in 2000 and showing a rate of growth of the order of 5% per year.

Many experts differ about these figures, expecting a more rapid slowdown in the rate of growth of that demand: but it must be remembered that the "consuming population" of the years around 2000 is already born and that the rate of increase in the numbers of energy consumers is unlikely to be less than 2% per year until the end of this century.

This leaves only a possibility for growth of the energy consumption per capita of less than 3% per year which seems likely to be correctly estimated if you

consider the political necessity for improving living conditions in developing countries and of the less favored people in industrial powers—USA, Europe, Japan and USSR.

How will the world's economy be able to meet such increasing demand?

It seems feasible to do this with a crash program for nuclear energy and for coal production. It does not appear likely that other sources of energy such as direct utilisation of solar heat will be of any significance before the end of the century.

The nuclear energy and coal supply are to a certain extent limited in their ability to meet the increasing demand.

Nuclear energy will be limited for a long period of time to the generation of electricity; its rate of growth is therefore directly connected to the construction of additional electricity plants. Assuming that all new plants will be nuclear from now on, the total contribution of nuclear energy to world energy supply will still be under 10% in 1985 and very likely not much above 25% in 2000.

This supposes, in any case, a drastic reduction in the period of time which is required to build a nuclear plant, from the moment of decision to the time when it is actually in full production: that period to-day seems to be more than 10 years in the USA, about 7 years in Europe and might be reduced to 5 years in the USA and 6 years in Europe. This supposes also a drastic switch to home heating by electricity, mainly in Europe, and the conversion of oil refineries to the use of nuclear heating.

Nuclear energy is only a partial solution to the present situation and not likely to have any effect before 1980. One additional advantage is that it represents a common solution for the USA, Europe, Japan and any other industrial society.

Coal may also be an excellent and more readily available source of energy. Experts see no technical difficulties to increasing very rapidly coal production in the USA. This may also be done in China, South Africa and Australia. However, it seems that coal production is unable to achieve any growth in Europe where its competitive situation, despite the increasing price of oil, is still unfavorable, with the exception of certain British and German pits.

In addition, coal use is essentially most suitable for electricity generation which is more likely to become dependent upon nuclear reactors. An increase in coal production does not directly fit the demand for car and aircraft fuel, and is not easily accepted as a modern home heating method, except perhaps for urban heating.

Any increased contribution of coal as a primary energy source is unlikely to be achieved unless an impressive R&D program is begun to transform coal into liquid or gaseous hydrocarbon products: that will not be done for a few years.

Further, even if every effort is made immediately to speed up the construction of nuclear plants and of coal production, the balance of the demand must still be met by increasing very rapidly supplies of oil and gas. The following table gives a probable evolution of the pattern of world supply (in millions of barrels per day of oil equivalent)

	1970	1985	2000
Coal	32	46	65
Hydraulic	4	6	10
Nuclear		18	110
Gas	18	35	64
Oil	46	104	160
Total	100	210	400

It shows that only a large increase in the supply of oil can match the world demand and, this I reiterate, even with considerable impetus given to the development of coal and nuclear energy. Without going into too detailed examination of the possibility of increasing oil production as high as 100 MB/D in 1985 and 210 MB/D in 2000, let me point out that the Middle East production, even in the most optimistic view, will not exceed 50 MB/D.

To understand the present situation, I must also emphasize that the picture given above of the global balance between energy supply and demand masks very different prospects for the USA and for Europe (See Appendices 1 and 2).

First, the immediate availability of coal and the importance of domestic oil and gas production makes the American picture a much more favorable one than the European one.

Secondly, gasoline represents a very different proportion of the production of petroleum products in the USA and in Europe—more than 40% in the US versus less than 15% in Europe. This gives potential flexibility to adapt the demand to a reduced supply without disturbing the rate of growth of the industrial sector.

The following table of comparative product consumption emphasizes these differences:

[In percent]

	USA	Europe	Japan
Gasoline	41	14	9
Mid-distillates	23	34	6
Heavy fuel oil	23	40	55
Others	13	12	30
Total	100	100	100

Actually, oil consumption in Europe and in the USA are now very close (16 MB/D in Europe, 18.5 MB/D in the USA): Europe consumes slightly more heating oil and fuel oil than the USA but this country consumes five times more gasoline than Europe.

Appendix 1

SUPPLY OF ENERGY FOR UNITED STATES

[Figures in million barrels per day oil equivalent]

	1970	1985	2000
Coal	6.6	12/15	20/25
Hydraulic	1.2	2	2
Nuclear	0.2	8	34
Oil:			
Domestic and Canada	10.4	12/15	12/15
Shales/tar sands			8/10
Imported excluding Canada	4.0	17/7	16/—
Gas:			
Domestic	11.2	8/10	8/10
Imported	.4	3	4
Total	34.0	62/60	106/100
Oil and gas imported as percent of total energy	13.0	33/16	20/4
Imported oil as percent of total oil supply	28.0	60/30	40

Appendix 2

SUPPLY OF ENERGY FOR EUROPE

[Figures in millions of barrels per day oil equivalent]

	1970	1985	2000
Coal:			
Domestic	5.4	3.0	2.4
Imported		.2	1.8
Hydraulic	1.6	1.6	1.8
Nuclear	.2	5.0	31.0
Oil and gas:			
Domestic	1.4	9.0	12.0
Imported	11.8	23.2	29.0
Total	20.6	42.0	78.0
Oil and gas imported as percent of total energy	58.0	56.0	39.0

Chairman Reuss. Thank you very much.

Mr. Saxonhouse suggested that the United States share oil with Japan, but only as part of a multilateral sharing agreement, includ-

ing Europe and perhaps Canada as well. I would like to ask Mr. Beigie and Mr. Vaillaud whether they would have any comment on that proposition as it affects, respectively, Canada and Europe.

Mr. Beigie.

Mr. BEIGIE. The first point, of course, is that Canada has to perceive itself as having something to share on the domestic side. At the present time, conservation measures that are being adopted in Canada in some sense provide the possibility for exportation, even in a bilateral or multilateral effort, are just not likely to have much effect.

I would suspect that the Canadian Government position would be very close to that taken by Mr. Saxonhouse, that it should be a multilateral effort.

My colleague may have something to say today about that.

Chairman REUSS. Do you have anything to add, Ms. Maxwell?

Ms. MAXWELL. Not today, Mr. Chairman.

Chairman REUSS. Mr. Vaillaud?

Mr. VAILLAUD. Mr. Chairman, I believe the second table in my prepared statement is a good way to look at the question you raise. Asking the United States to import less oil, so that the Japanese economy will have more, will mean that cut on oil imports of the United States will be higher than 30 percent. And the difficulty as far as I know, which has existed until now, is that it is very difficult to try to equalize the last column in the table without changing very much the first one.

And you cannot really increase the cut in energy consumption on the United States in the third column unless you increase very much the cut of oil imports for the United States. And up to now it has not been possible.

For Europe it is a—just an equal situation, since Europe is just in the middle between Japan and the United States, and the problem will mainly be a diversion of oil imports to the United States instead of Japan rather than any oil from Europe. Europe will not be affected by such kind of solution.

Chairman REUSS. First, Mr. Vaillaud, what would you think about sharing of scarce oil between members of the European Community, and, second, should the United States participate in any such sharing, if you think that sharing is a useful idea?

Mr. VAILLAUD. Mr. Chairman, there is a difference between the two parts of your question.

There is today an agreement between OECD European countries which may be put into action, under which oil supplies will be shared among these countries if a political decision is taken by the Council of Ministers of the OECD. That decision has not been taken up to now. In a few days there will be discussions at a political level between the heads of governments in Europe, and this may be one point of discussion.

If you consider the possibility of the United States of America joining this agreement with Japan, Australia, and Canada, the four countries which are not yet part of this supply-sharing agreement, then that decision is not only a question of the European peoples, it is also a question of decision by the Government of the United States. And I am not in a position to give any answer to that point.

Chairman REUSS. What impact on production and gross national product do you expect on the economies of Europe from the curtailment of oil shipments?

Mr. VAILLAUD. There are three kinds of countries.

The first one is the Netherlands which has been cut 100 percent by the Arab countries—who provide at least 40 or 50 percent of the Netherland's total oil supply. It is certainly not possible for the Netherlands to support such a decrease without a reduction in their industrial activity.

On the other hand, you have France which has a very large stockpile. Total oil supply is to be cut between 10 and 15 percent. This will represent 4–5 days of stock used every month. However, France can afford such withdrawals from its reserve stock for a very long time. The primary effect of the crisis will not be serious in France. But France is likely to feel it in some months with the overall slowdown of the European economy.

The third group of Europeans are cut about 20 percent which represents 6 days of stocks every month. This will mean that within 6 months their reserves will have been used up. At that time a slowdown or at least no growth in the European economy may occur.

Chairman REUSS. If the oil supply situation were to become more critical, what would you think about the willingness of the European Economic Community countries to participate in a counterembargo against the oil producers, and the efficacy of such a counterembargo if it were attempted?

Mr. VAILLAUD. That is a very difficult question to answer, and I am not in a position to answer it. But I will say that it is unlikely that such an action will be taken. I think the European people are mainly concerned with the fact that they need the oil. They are not in the same position as the United States, which can support a 5-percent reduction in their energy supply with no reduction in industrial growth. The European people must have the oil, or they will go through a very severe recession. And they will try by all possible means to get the oil from the oil-producing countries, even at a higher price.

Chairman REUSS. I notice that this week there was another upward movement in oil prices signaled by a $16 a barrel sale by Iran, more than three times the previously posted prices.

What effect do you see on European production and on balance of payments of that?

Mr. VAILLAUD. I think there may be two effects.

The first one is a purely economic effect. That is, as far as the price of oil goes, that must slow down the rate of growth of the European economy. And then when it goes up very fast, it has an immediate and automatic effect on the rate of growth.

But the second effect may be worse. Until now, payments going to the Middle East for oil supplies to Europe, came back to Europe—either for exported goods or as deposits in European banks. Any increase in price had really no effect on the European balance of payments.

But that may not be true any more since part of that money may no longer come back to Europe.

Chairman REUSS. Mr. Saxonhouse, would you comment on that Iranian price increase to $16 a barrel this week and its likely impact on the Japanese economy?

Mr. SAXONHOUSE. I can only say that if that price persists it will have an extremely serious effect on the Japanese balance of payments. At the same time, I suspect that with increasing market allocation of oil around the world, Japan might benefit. There is some reason to believe that the opportunity cost of oil in the Japanese economy is much higher than elsewhere, or at least somewhat higher than elsewhere. One suspects that if there is a reallocation of oil through the marketplace among the consuming countries on the basis of economic need overall, the Japanese economy will come out in better shape than it otherwise would.

Chairman REUSS. Mr. Beigie and Ms. Maxwell, in your joint prepared statement you came to the conclusion that the energy shortfall in Western Europe and Japan will have an effect of slowing down their economies, which you then envisaged as causing a net negative impact on Canadian exports and a subsequent slowing down of the Canadian economy.

Would you spell that out, in as much detail as you can, the primary effects and the secondary effects of energy shortages abroad. I take it that your analysis predicts slower growth, less purchasing power, fewer Canadian exports purchased. But what have you used in terms of elasticity estimates?

Mr. BEIGIE. We have no rigorous model, Mr. Chairman. And I must stress again the point that I thought Mr. Saxonhouse made very well, that we are in a very crude environment in terms of forecasting impacts. We are reporting more than analyzing in the space we had available for preparation of this testimony.

Let me just say, Mr. Chairman, that I think we must be extremely careful and cautious about applying traditional forecasting techniques to a period in which you are dealing with supply shortages rather than demand shortages. To the extent that purchasing power remains high, either for reasons of accumulated liquidity or for attempts at transfer payments by the governments of the United States or any other industrialized county to try and ease the burden of the impact, there will be a tendency for purchasing power to be shifted to those countries that can supply production in the short run. And this is one of the reasons why I put the point in my prepared statement, that this is going to make it particularly difficult for Canada to insure that a sufficient portion of domestic resources are going to be available for domestic investment. There will be a tendency, I believe, on the part of other countries to want to import as much from Canada as possible.

Having said that, our view is still that there will be a modest negative impact. And this was an order of magnitude question rather than a specific forecast.

There is the likely negative impact arising from the fact that Canada has to import in order to export. A simple example would be automotive production where, if the parts are not available for import, it will be difficult to assemble them in Canada.

So, taking all these factors into consideration, we would think there would be a modest, and we would stress modest, negative impact on the Canadian position.

And my colleague will expand on that.

Chairman REUSS. Ms. Maxwell.

Ms. MAXWELL. The thing that is unusual about the Canadian export position is that between 40 and 45 percent of our exports are industrial materials, iron ore for steel plants in Japan and the United States, coal for steel mills in Japan. If those steel mills are functioning at less than capacity they obviously order fewer of these materials from Canada. And this immediately leads to industrial impacts in Canada which have no relation to a shortage of energy in Canada. But they can have a dramatic influence on the rates of growth of our exports.

The finished goods that we sell to the United States mainly account for only about 16 percent of our exports. As Mr. Beigie has said, we have a limited amount of capacity to produce those finished goods which might be in great demand.

So that we feel that the main impact is going to come more from the industrial materials than it is from the finished goods that we are exporting.

Chairman REUSS. What are the industrial materials that you sell Japan, paper and lumber?

Ms. MAXWELL. Lumber, coal, iron ore, copper, a lot of metals and fuels, plus the forest products.

Chairman REUSS. Tin?

Ms. MAXWELL. Not very much tin, but some. Nickel, copper, aluminum, coal, and I think iron ore would be the principal ones.

Chairman REUSS. And you see those as making you at least modestly vulnerable to a slowdown, because if the wheels turn around slower in Japan, they are going to chew up fewer raw materials, whereas if you were exporting a lot of consumer goods it might not affect you, because the Japanese spending power is released from one thing and turned to another?

Ms. MAXWELL. That is right.

And, of course, our trade is also dominated by transactions with the United States, and there is a very similar relationship there.

Chairman REUSS. You have enough to worry about with Canada, I suppose.

But I would welcome any transfers of your analysis to this country. We export vast quantities of agricultural commodities to Japan. And so do you; don't you?

Ms. MAXWELL. Yes, we do.

Chairman REUSS. Now, those should not be much affected; should they?

Ms. MAXWELL. I don't think so. I think that the basic thesis that we have put forward is that in the first year at least you would not see a reduction in incomes or in spending power in export markets. The reduction in demand comes at the industrial level where plants are working on reduced hours or being shut down. So that in the case of something like food, where it is clear that people aren't going to be eating less than they were before, I think that you will find that the demand will be sustained through the next year.

Chairman REUSS. Mr. Saxonhouse, I don't recall whether you had anything in your prepared statement to say about the effects of a slowdown in Japan on U.S. exports.

Mr. SAXONHOUSE. Yes, I did actually address myself to this question.

Chairman REUSS. What did you say?

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Mr. SAXONHOUSE. Insofar as the exports of agricultural commodities and industrial raw materials are concerned, I suspect that they will be very little affected by the slowdown in Japan.

One normally thinks of the income elasticity of these products as relatively small by comparison with the more superfluous consumer durables. For example, notwithstanding a serious slowdown in the Japanese economy, I can only be optimistic about the export potential of an industry such as forest products in Canada. There is right now a very serious shortage of paper and pulp products in Japan. This shortage will be aggravated by the new controls on the energy supplies given to the pulp and paper industry in Japan.

I am quite certain that forest products——

Chairman REUSS. Not only paper, but with lumber, Japan I would think would keep right on redressing its shortfall in decent housing. And that doesn't take too much energy.

Mr. SAXONHOUSE. Exactly.

I think the estimates for investment in housing in the coming year look very good, notwithstanding the overall downturn in the economy. I think that will be one area of strength. And there will be continued future growth in that area.

Chairman REUSS. What, very quickly, is the composition of our exports to Japan in major categories?

Mr. SAXONHOUSE. As I indicated in my prepared statement, 70 percent of our exports to Japan are agricultural and industrial raw materials. I suspect that those will not be greatly affected.

Chairman REUSS. The agricultural won't. Let's look more closely at those industrials, though. If they are like Canada's principal exports—aluminum, iron ore, and coal—and I doubt that they are—then it might not be as cheerful.

What are they?

Mr. SAXONHOUSE. Of the total overall exports of the United States to Japan, approximately 32 percent are industrial raw materials.

Of the industrial raw materials chemicals account for $250 million. Logs and lumber account for $450 million. Coal accounts for $185 million. Very likely none of these commodities will be hard hit. Similarly for metal, metal ores, concentrates, and scrap, which account for $200 million. I should point out Mr. Chairman, that the export totals I am giving you are for the first 6 months of this year.

Chairman REUSS. Scrap might show some falling off, might it not?

Mr. SAXONHOUSE. It might. But one suspects that given the supply and demand relationships in this industry in the last year or so, I would hardly think that we would be unhappy about that in this country. There have been shortages in this area, and prices of these commodities have been rising.

Chairman REUSS. We were thinking at one point of putting embargoes on our scrap. So maybe this would work out all right.

Mr. SAXONHOUSE. From the point of view of the American consumer I can't imagine that this would be a serious problem. It certainly might do something to profits in this particular industry, but that is another matter.

Chairman REUSS. Does that about cover it?

Mr. SAXONHOUSE. There are $140 million of raw cotton exports.

Chairman REUSS. What about machinery?

Mr. SAXONHOUSE. Machinery accounts for $650 million. I think here there is the possibility of a serious downturn in American exports to Japan. I think it is very clear that plant and equipment investment next year is going to be cut back extremely sharp in Japan. There will be an unprecedented decline by any standard, Japanese or otherwise.

At the same time I think one should recognize that only 5 percent of American exports of machinery and transport equipment go to Japan. And, of course, this overall figure of American exports of machinery and transport equipment is very small, as a proportion of total American production of such products. I don't think one will find a serious problem for any major American industry from this source. Of course, there will be isolated regional and specific product impacts.

Chairman REUSS. Mr. Gardner, if you were asked to advise a less-developed country that had a scarce resource of oil, tin, copper, whatever, how best to maximize its revenues and promote development, what would you suggest to it, in terms of how it can improve its terms of trade?

Mr. GARDNER. That is a very difficult question to answer in the abstract, because the terms of trade and trade conditions vary so substantially, as between different commodities. There are some commodities in which the organization of seller's power, of the OPEC variety, is, and can be effective. There are other commodities, where, either because of the availability of synthetics and substitutes or production facilities within the developed world, or the difficulty of organizing the producing countries into an effective trade union, that kind of tactic is not likely to be effective.

But if I may make one general point, I think the central message that I would like to transmit to the developing countries as a group, that I would like to see our Nation and the other industrialized nations transmit, is that it is all very well to talk about sovereignty over national resources, which is the big slogan we hear about in the United Nations, the Algers conference, and so on. We are sovereign over our capital resources, technology, and food. But what else is new? We are living in an interdependent world. It is not going to be a very happy world, it may not even be a world in which civilization in a meaningful sense can survive into the 21st century, until so-called sovereign nations recognize some minimum moral, political, and legal responsibilities that derive from the facts of interdependence. And if other currencies can play games, we can play games, too. I have some absolutely incredible statistics on the world's growing dependence on North America for food. Our food exports have grown from about 4 million metric tons in the period 1934–38 to about 84 million metric tons last year. The food deficits of Asia, Africa, and the Middle East have grown in the most extraordinary way.

Now, I think we should recognize an obligation deriving from their dependence on us for food, as well as aid and capital and technology. But I think that we have to say, diplomatically, politely and constructively, that there are some necessary obligations that derive also in terms of our dependence on them for certain increasingly important raw materials.

Chairman REUSS. There is a movement to reimpose the prohibition on the import of chrome ore from Rhodesia in support of the United Nations sanctions.

How do you resolve that conflict?

Mr. GARDNER. Well, this takes us into a rather complicated discussion. I will try to be brief. But here is where we get into some distinctions that may or may not seem persuasive—they are persuasive to me, however—distinctions between unilateral, national action through trade cutoffs, to impose foreign or domestic policies on other countries—something which I think is dangerous, and can only lead to the destruction of a cooperative world economy, on the one hand, and, on the other hand, trade sanctions taken pursuant to legally binding decisions of the Security Council of the United Nations, where there is a clear and present threat to international peace and security.

Now, the rationale behind the multilateral cutoff on trade to Rhodesia which was taken by the United Nations Security Council in 1966 was that the country which had the sovereign authority in that area, the United Kingdom, and not consented to the breakaway government, in which the 6 percent of the population which was white was ruling the 94 percent of the population which was black.

In the then existing circumstances, that illegal secession was a threat to international peace and security in the middle of a black continent. The new Government of Rhodesia was not in fact a legitimate government, and was not recognized as such by any member of the U.N. And in those circumstances an embargo by the Security Council, in the light of its finding of a threat to international peace and security, was valid and legally binding upon us.

I therefore feel, Mr. Chairman, that as a member of the United Nations we should honor that decision and repeal the Byrd amendment.

But I do distinguish this from the kind of action that the Arabs take against us or, if I may be frank, the kind of action which was taken by the House of Representatives yesterday in adopting the Jackson amendment.

Chairman REUSS. What likelihood of success would you see in a counterembargo against those Middle Eastern countries which are holding up oil exports to the United States? How would such an embargo be strengthened if Europe and Japan joined in, and how would your requirements of multilateral action be satisfied if they did?

Mr. GARDNER. I think the short answer to your question is, first, there is very little we can do to the Arab countries alone, because most of the things that we would restrict—food, medicines, foreign aid, miliary aid, private investment, technology—they could get from Europe or Japan or Australia or Canada. So, unless we have a large degree of cohesion among the OECD countries, counter embargoes are just not on in terms of effectiveness.

Now, as others have suggested here today, the present political prospect of getting the necessary cohesion from our OECD partners for joint action of this kind is zero, for several reasons.

First of all, because the OECD world is in terrible disarray.

Second, because of the heavy dependence of the Europeans and Japan on this oil, and their understandable desire to try to protect themselves in the short run by persuading the Arab countries to give them special treatment.

And third, because of the general feeling that we should try to work our way out of this bind through quiet diplomacy and friendship and working for a Middle East settlement.

Therefore, Mr. Chairman, I am not advocating a counterembargo now, because I think the next thing to do is to try to get the Middle East settlement between now and next summer, which would make it possible for the embargo to be ended.

But what I am urging here today is that we look beyond the next 6 months and look at the situation that may confront us, let's say, next fall, if we still haven't got a Middle East settlement, and if we are confronted by a continued Arab oil embargo, and if we find ourselves confronted with the use of the oil weapon or other raw material weapons on other issues which I suggest may become something that we will have to face in the coming years. And I think it is long past time to try to begin in the GATT, and the OECD and the UN, to start developing a new concept of collective economic security, or if you prefer, the moral and political and legal implications of interdependence, to make it clear that the countries that possess a virtual monopoly of the world's food and technology and capital and management skills will not idly sit back and see themselves preyed upon individuals by those who possess certain important raw materials.

I can supply—I am sure the committee already has available to it—statistics about the dependency of the Arab countries on us for certain things. You are undoubtedly familiar with the study which the Library of Congress did for the House Foreign Affairs Committee on the food question, which shows that Saudi Arabia and Algeria have a very substantial and increasing dependence on imports of food.

And given the present trend of world food scarcity, other Arab countries have begun—among them Iraq and Syria last year—to import a substantial portion of their food needs. And I think that the prospect is that their dependency on us in this area is going to grow. When I say us, I mean on the OECD world, and particularly Canada, Australia, and the United States.

I would not like to see the day come when we have to manipulate the food weapon. But I think if this oil situation should continue indefinitely, we will have to start diplomatically suggesting that this is a game that others can play.

Chairman REUSS. Mr. Beigie, what is your reaction to the strategy suggested by Mr. Gardner?

Mr. BEIGIE. I couldn't agree with him more than the chances for such concerted action now are extremely low. I cannot pretend to speak on behalf of the Canadian Government. But it does appear to me that Canada is in a position somewhat unique in the OECD membership in that it has, as I indicated in my prepared statement, the capability of self-sufficiency. And in the period until it achieves this self-sufficiency on the energy front via the investment in the necessary transportation facilities, I suspect that Canada would be extremely reluctant to join in any international effort designed to provide a counterembargo.

There is a tendency, I believe, on the part of the Canadian people to feel that in some respects this is an issue that lies outside them, except for a very short term period, because, as I say, the Canadian economy is based on a rather complete mix of products capable for sustaining the basic aspects of their living.

So I do not think that in the absence of a complete embargo on Canada, that this kind of proposal for joining in multilateral action would have much chance of success from the Canadian perspective.

At the same time, I want to go back and repeat what I did say, that the solution that Mr. Gardner is talking about seems to me to be the sensible one, to try and look beyond the current crisis and to take into account the fact that trade policy has to look just as much on the export side as on the import side, which has been the focus for most of our discussions in the past.

Chairman REUSS. Mr. Saxonhouse, what can you say about the likelihood and effect of Japan's role in the strategic scenario?

Mr. SAXONHOUSE. If Mr. Beigie can't speak for the Canadian Government, so much less can I, not being a Japanese citizen, presume to speak for the Japanese Government.

Because of Japan's very extreme vulnerability, I find it difficult to believe that Japan would play anything like an initiating role in such a multilateral arrangement. I would say also that because of the actions taken by the international oil companies, which are dominated by some of Japan's OECD partners, in diverting substantial proportions of the non-Arab Japanese oil supply to other countries, I think Japan's sense of trust that it will be fairly treated in a cooperative arrangement with other OECD countries is surely weakened. So while I suspect that if a well-conceived arrangement was worked out Japan might join, I cannot believe that Japan would play a leading role in the initial stages of developing such a policy.

Chairman REUSS. Mr. Vaillaud, do you see any prospect of the countries of Western Europe at some point being willing to join in a counterembargo?

Mr. VAILLAUD. No, Mr. Chairman. I am in agreement with the first part of Mr. Gardner's statement; at the moment Europe is still importing 10 million barrels per day of Arab oil, which is about the equivalent of the total U.S. domestic production. And Europe is unlikely to take any steps which will endanger the importation of such an amount of oil.

In the longer term I do not believe either that they will join any counterembargo. Because a threat does not seem to me to be the proper way to bring about a solution of the problem of supply. The proper way to me seems to be a settlement in the Middle East and immediate steps to insure new sources of supply, such as increasing coal production, building nuclear plants, exploring for new oil, deep gas, deep sea oil, and so on is more important than any counterembargo.

Chairman REUSS. Leaving aside the question of a counterembargo, what is your view of the recent proposal of French Foreign Minister Jobert that a conference be held between the Common Market countries and the Arab States to discuss the financial, technological, and energy relationships? Does this proposed strategy of exclusive French conversations seem to you the best approach, or should the United States and Japan be brought in as well as the other countries?

Mr. VAILLAUD. On the first part of your question, I believe that this stems from the same approach as my previous answer. By discussion with the Arabs try to find a way to convince them that they have a responsibility in world affairs now. And it will certainly be on the basis of European, not only French, diplomacy. I do not know whether other countries will join as I am not in a position to speak for them.

Second, it may be useful to know first if such procedure is likely to bring any results before inviting other countries to join the discussions.

Chairman REUSS. Did you have something to add, Mr. Gardner?

Mr. GARDNER. Yes. The semantics of this, I think, may make sometimes for misunderstanding. If the question is posed, should we have a counterembargo, of course, I think there will be few people that will enlist under that banner today. I would rather put the question this way, Mr. Chairman. How can the industrialized countries or developed countries of the OECD world in the years immediately ahead promote the proper sense of responsibility, not only among themselves, but on the part of Arab countries and other developing countries, about the requirements of interdependence?

Now, the OECD world will be asked in the next few years to undertake some very substantial commitments by the developing world. We will be asked at a world food conference next November to subscribe to the concept of world food security and commit ourselves to world food reserves. We will be asked to commit ourselves to very important measures in the trade field, to important additional measures of food aid for developing countries. We will be asked—in fact we are already being asked—to subscribe to another replenishment of the International Development Association, as to which I had the privilege of testifying before you just a few weeks ago.

And I think it should not be beyond our capacity in diplomatic negotiations, we and our partners in the developed world, to make it quite clear that international cooperation cannot be a one-way street, and that as a practical matter of democratic policy we will be unlikely to persuade the American people and the American Congress and the people and parliaments of other developed countries to make long-term commitments to put their resources under international and multilateral management for the benefit of others if the recipients are not willing to make similar commitments.

One of the paradoxical elements in the present situation is that many of the developing countries are cheering on the Arab nations in this Arab oil embargo. To many of them this is a great thing. The United States is getting its own back, that is the kind of word you hear often in the corridors of the U.N.—"kick them again." Now, I don't say that is the universal or general attitude, but I do hear some of this. This is very shortsighted. Maybe there would be some way of saying, for example, to the countries of the Sahara region—which are utterly dependent on American generosity and the generosity of other food-supplying countries and developed countries over the next few years, they are in a desperate situation—but many of them are cheering on the Arabs in this oil embargo—now, are we going to be able to discharge full responsibilities to the countries of the Africa-Sahara region, many of whom are Moslem countries, if the actions of the Arab oil-producing countries persist? This is a basic fact of life that we are going to have to confront and we must find some diplomatic way of presenting it to the international community.

Chairman REUSS. Ms. Maxwell, and gentlemen, you have been most helpful to the subcommittee. And we thank you for your statements.

We will now stand in recess until 12:15 p.m., when we will hear Governor Tribbitt of Delaware.

Thank you very much.

[A short recess was taken.]

Chairman REUSS. The Subcommittee on International Economics will be in session.

We are delighted to have with us the Honorable Sherman W. Tribbitt, Governor of Delaware, who has been having a busy time in Washington this morning.

We are glad you are here, Governor. You have a statement that you have been good enough to prepare for us, which under the rules and without objection is incorporated in full into the record. And would you now proceed, sir, in your own way.

Governor TRIBBITT. Thank you very much, Mr. Chairman. I indeed appreciate the courtesy extended me, sir. And I apologize for being late even with the committee's recess. But the Governors in Washington this morning were invited to be briefed by the President and Mr. Simon, and I found it difficult to walk out while the President was speaking. So I apologize for the delay.

Chairman REUSS. Not at all. You have kept in close touch with us. And we are glad to see you.

STATEMENT OF HON. SHERMAN W. TRIBBITT, GOVERNOR OF THE STATE OF DELAWARE

Governor TRIBBITT. Mr. Chairman and members of the committee, and present guests, first of all, your crowded agenda during the course of these hearings indicates that you share my concern over the economic impact of the energy crisis.

With that long agenda in mind, my remarks will be brief. None of us would benefit from a retelling of the history of the energy crisis.

Today, I am here to discuss in particular what Nevada Governor O'Callaghan has called my "aggressive and farsighted approach" to mitigate the economic impact of the energy crisis on the 50 States.

That is—my program, as outlined in my letter to Delaware's congressional delegation, and the 49 other Governors, for an emergency Federal subsidy.

Somewhere along the way, my proposal has picked up the nickname "energy crisis revenue sharing." You don't know how pleased I am with part of that title, Mr. Chairman. But anyway, let me state firmly that the distribution and formula for it would be far different from general revenue sharing programs.

But I'm getting ahead of myself—let's go back a step and look at the overall situation. Initially, all Governors were faced with the task of responding to what was then considered an "energy problem."

But in a few short months, we saw the Arab oil boycott cap our Middle East pipeline. And an "energy problem" became a "crisis."

Like other Governors, I have successfully negotiated energy cutbacks in several sectors of my State's economy by private discussions with industry.

That helps the situation, on a statewide basis. But the framers of our national Constitution did not grant to the States the power to formulate national policy. Only the various Governors' conferences and the opportunity to gather, such as at Governor Hathaway's National Governors' Conference meeting today, grant us the possibility of acting in concert.

But this meager result of our most earnest efforts, falls far short of what could be accomplished and should be accomplished swiftly and boldly by the Nation's Chief Executive.

As I stated in my speech to a joint session of the Delaware General Assembly on November 16th: "The President slapped the (energy crisis) problem on the desks of the 50 Governors, who have little or no power to fight a national crisis, and total inability to develop the required comprehensive national policy."

The 50 Governors cannot determine national policy—sometimes we would like to, but we can't—nor should we determine national policy. We Governors do not have the resources, the input, the power.

This leadership void at the national level can lead to chaos. Look, for example, at the protests of independent truckers. Here are individuals, whose problems cannot be resolved by any single Governor.

The truckers' close relationship with the Interstate Commerce Commission points up the need for uniform Federal action. At the same time, a comprehensive Federal policy would help to convince all Americans that this is not a fabricated crisis, nor a punitive action aimed at one special interest group.

The President's new energy czar, William Simon, seems to indicate the American public is the special interest group about to feel the crunch. He is quoted in a UPI dispatch of December 10th as saying: "We believe the American people will be delighted to suffer some inconveniences" to save jobs and prevent a recession.

And compounding that, Simon said that rather than having industry feel the major impact of the fuel shortage, and I quote: "We hope we can shift the burden to the American people," mainly by curtailing the use of gasoline and home-heating fuel. That's a staggering assessment.

I tell you today that there will be a severe economic impact—and that the burden should not be carried by any one group. It should be, and must be, borne by all segments of America—business, industry, commerce, the public, and so forth. This is the approach I am taking in Delaware.

There is no question in my mind that the economic impact will be strong—if the Arab oil boycott continues for an extended period. And my belief in that statement, Mr. Chairman, was just substantiated a few minutes ago by remarks Mr. Simon made before the group of Governors assembled in the White House.

In Delaware, as in every other State in the Union, we are now trying to assess just what that impact will be. While the economists are still debating the level of impact, some things are clear.

I predict it will most assuredly be a negative impact.

We are making a tentative estimate that with the Arab oil embargo, industrial output—on a national level—probably will decline 2½ percent.

Total personal income may not increase at all during the Arab oil boycott—and may even decrease as much as 2 percent.

In the long run, major increases in unemployment are likely.

In the short run, unemployment will be less visible.

Increases in the cost of crude suggests that the retail price of gasoline may well climb to 65 cents a gallon within 3 to 6 months.

If price rationing occurs as a result of an energy tax, gas prices could reach $1 a gallon or more. This could mean trouble in my home State of Delaware.

"The First State" is heavily dependent on the assembly of full-size automobiles. Next week General Motors, as many or you know, plans to close down 16 plants assembling full-size cars. Included on the shutdown list is Delaware's own GM plant.

Also threatened would be the other four industries which, along with automobile assembly, make up the five leaders in supporting my State's economy—that is, petrochemical operations, agribusiness, tourism, and retail sales.

All five will be hit severely by various aspects of the energy crisis. And though Delaware is geographically small, it could be hit harder than many other, larger States, by the economic impact of the energy situation. The impact surely will vary, State to State. Let me give you another example.

While unemployment may reach only 6 to 7 percent nationally, it may run several percentage points higher in some States. Due to my great concern over the diversity of impact of the crisis, I have put forth my "energy crisis revenue sharing" proposal. Let me quote a brief segment from the resolution I proposed to the Mid-Atlantic Governors' Conference, and which has been already provisionally endorsed by the Governor of Pennsylvania. Endorsements from New York, New Jersey, Maryland, and West Virginia are expected promptly. The resolution stated:

It is glaringly clear that if the economy is adversely affected, States' tax revenues will be seriously, but unevenly depressed. * * *

And due to the financing of the States' operation, including requirements for balanced budgets—

And my State is one that has the statutory requirement—

It would well be that in a time of increased unemployment and depressed economy, States may be forced to levy additional taxes on their already hard-pressed citizenry.* * *

I firmly believe it is essential that the Federal Government come to the aid of the States to provide subsidies during the crisis.

My proposal requests that Congress proceed quickly to enact legislation to provide substantial energy crisis revenue sharing to the States on this formula basis:

Ten percent of the appropriation would be divided equally among the 50 States. And of course, that would obviously be different from the formula established in revenue sharing.

Forty-five percent of the total appropriation would be divided among the States on the basis of shortfall in energy supply, using 1972 as the base year.

The remaining 45 percent of the appropriation would be divided among the States on the basis of each State's share of unemployment attributable to the energy crisis. In that way, every State would receive something. Larger sums would flow to the States with the biggest problems, thereby evening out the fiscal impact of the crisis.

And those moneys would go directly to the 50 State treasurers.

At this point, the size of the appropriation necessary for fiscal years 1974, 1975, and 1976 has not yet been determined. This is because it is

not yet possible, at least in my judgment, for the States to assess the projected loss of revenue.

We do feel that it will be necessary to provide a lesser sum for the remainder of fiscal 1974, a much larger sum for fiscal 1975, and again, a smaller sum for fiscal 1976, although, to go back to what I just learned at the White House, this energy crisis could far exceed the lifting of the embargo as far as the Arab oil is concerned.

When we take into consideration that the State of Pennsylvania right now anticipates a loss of some $44 million in revenue in fiscal 1974 in gasoline revenue alone, due to the crisis, it becomes clear that projected across the 50 States, we undoubtedly are talking about billions of dollars.

The President has shunted off this economic matter—along with the rest of the problem—on the 50 Governors. The Federal bureaucracy has at the moment failed to respond vigorously. We the Governors must make the President, you of the Congress, and the people, aware of this crisis. It has come barreling down on us so rapidly that it is impossible to scale down expenditures for the approaching fiscal year.

With reduced income levels, it is doubtful that we could carry on governmental functions at the current pace. In fact, a recession could cause the States to expend more money. We can spot some areas where problems will occur: Welfare, medical care costs, and new demands for mass transit. That would only further widen the fiscal gap.

Unless we treat the economic consequences of the energy crisis at a national level, with support of the Congress, individual States will have to levy taxes.

But new and more burdensome taxes will further fuel the recession in each State's economy—and make the national economic situation even more critical than projected—and the long road back even tougher. I ask your support in this crucial matter. Thank you.

Chairman REUSS. Thank you very much, Governor Tribbitt.

[The following summary was attached to Governor Tribbitt's statement:]

SUMMARY OF ACTIONS TAKEN BY GOVERNOR TRIBBITT IN THE STATE OF DELAWARE IN RESPONSE TO ENERGY PROBLEM AND LATER ENERGY CRISIS

Action

January 18, 1973: Executive Order No. 1: Re Fuel Conservation—Directing State offices to begin program to conserve energy in State-owned or leased facilities.

May 4, 1973: Executive Order No. 8: Creating Delaware Energy Emergency Board to study conservation and allocation of fuel.

June 12, 1973: Executive Order No. 12: Dealing with energy conservation in State facilities during the summer.

August 24, 1973: Letter to John Love, the President's "Energy Czar" urging that the nation proceed with mandatory allocation program for middle distillate fuel as soon as possible.

November 7, 1973: Press Release: Announcing suspended action on series of recommendations of the Delaware Energy Emergency Board, pending President Nixon's major statement on energy crisis.

November 9, 1973: Executive Order No. 25: Reducing speed limit of State-owned vehicles to 50 mph.

November 12, 1973: Executive Order No. 24: Designating Monday, December 24, 1973, a holiday for State Employees to save fuel over holiday weekend.

November 12, 1973: Announced toll-free telephone number for emergency fuel information or requests.

November 12, 1973: Kicked-off public awareness program throughout state.

November 15, 1973: Proclamation: Declaring State of Emergency and convening the Delaware General Assembly into Extraordinary Session to consider legislation to alleviate the energy crisis in Delaware and grant Governor special powers to take action to protect interests of citizens.
November 16, 1973: Speech before Extraordinary Session of the 127th Delaware General Assembly re State of Emergency during energy crisis.
November 17, 1973: Press Release: Statement on the failure of the GA to pass a measure on the energy crisis.
November 19, 1973: Declared Friday, November 23, 1973 a State Holiday to conserve fuel over holiday weekend.
November 20, 1973: Signed S.B. 397 Providing the Governor certain authority and emergency powers during Energy Crisis.
November 21, 1973: Executive Order No. 29: Reducing speed limit to 50 mph on all highways within the state.
November 21, 1973: Executive Order No. 30: Ordering an inventory of various energy reserves and resources within the state.
November 21, 1973: Special Delivery letter to President Nixon: urging the President to directly contact all Governors to brief on the energy crisis in general and Arab oil shipments in particular.
November 21, 1973: Letter to Delaware's Congressional Delegation urging them to introduce legislation in Congress to provide subsidies to the states during the energy crisis, and recommending a formula therefor.
November 26, 1973: Letter to all Governors requesting their opinion on above proposal.
November 26, 1973: Letter to President Nixon transmitting copies of letters to Governors and Delaware's Congressional Delegation re subsidies and asking his comments or suggestions on the proposal.
November 26, 1973: Press Release: Regarding proposal of federal subsidies to states during energy crisis.
November 26, 1973: Announcement of approval by Bipartisan Joint Legislative Committee of Executive Orders 29 and 30.
November 30, 1973: Announcement that gasoline sales will be limited on Sundays on the Delaware Turnpike.
December 5, 1973: Letter to Robert Berney of the Advisory Commission on Intergovernmental Relations in Washington acknowledging his interest in proposal for federal subsidies.
December 5, 1973: Press Conference at which statements were issued relating to: 1) Executive Order No. 30, and 2) agreement of outdoor advertising agencies to reduce by 25 percent the lighting of outdoor billboards, poster panels and electrical signs during the energy crisis.
December 7, 1973: Resolution proposed for adoption by Middle Atlantic States Governors, requesting Congress to enact legislation providing "substantial Energy Crisis Revenue Sharing to the various states" during the crisis.
December 10, 1973: Press Release: Announcing lighting cutbacks of at least 25 percent on the Kennedy Turnpike and other state highways.
December 11, 1973: Press Release: Announcing agreement with management of Dover Downs and Brandywine Raceway on at least a 25 percent overall cutback in energy consumption.
December 11, 1973: Press Release: Announcing 1) Governor Tribbitt's attending the special convening of the National Governors' Conference "Committee on National Resources and Environmental Management", and 2) his invitation to make a presentation before Congressman Reuss' Special Fact-Finding Subcommittee of the Joint Economic Committee relating to his "unique energy crisis revenue sharing proposal".
December 12, 1973: Announcement of agreement by Delaware Retail Association of a 15 percent energy cutback by all members of the Association.

Chairman REUSS. What are the principal tax sources of Delaware's revenue?

Governor TRIBBITT. The principal single source of Delaware revenue, sir, is the personal income tax. That is the largest single source of income. Corporate franchise taxes run a close second, and graduate on down. But franchise taxes and personal income taxes are two of our largest single sources of income.

Chairman REUSS. What is the top bracket of your income tax?

Governor TRIBBITT. 19.8 percent.

Chairman REUSS. Individual?

Governor TRIBBITT. Yes, sir.

Chairman REUSS. Does Delaware have a State constitutional prohibition against going into debt?

Governor TRIBBITT. We do not have a constitutional provision, sir. We have a statutory requirement requiring the Governor to present a balanced budget.

Chairman REUSS. Now, what you are suggesting here is that the Federal Government go further into debt. We have accumulated large deficits in the past, and it looks as if the Federal debt will continue to grow. Why not just change your statute so that you can share the deficits with us?

Governor TRIBBITT. Mr. Chairman, speaking for my own State—and I presume this is true in a great many States—all States would then have to change their philosophy of financing the State government and then go to the theory of perhaps deficit spending. The Federal Government has been in this area of deficit spending. And I am sure this was the same kind of question that was asked when the revenue sharing was originally promoted.

Chairman REUSS. When it was originally promoted it was sold on the idea that the Federal Government was going to be running a surplus, and in order to get rid of some of the surplus, we should share it with the States and local governments. But that unfortunatley didn't turn out to be true. If we in the Congress vote this plan, would you be willing to come down here and explain to our irate constituents why we are continuing deficit financing?

Governor TRIBBITT. If you have irate citizens who are in that category, I would take the same position that has been taken in the past, that with revenue sharing goes any other service that the Federal Government furnishes the State.

I might say to you, Mr. Chairman, if I may add, sir, that whatever route Congress goes, if they go the route of trying to control, for example, gasoline consumption, if they go the route of additional taxes and use that route over rationing, that will indeed provide additional revenue for the Federal Government. And I would look in that area, sir, to share in that.

Chairman REUSS. You indicate the amount of the Federal appropriation?

Governor TRIBBITT. No, sir, and I didn't know how I could, sir. I can't even at the moment, sir, estimate what the energy crisis economically—how it is going to assess our State in the loss of revenue in relation to unemployment or forms of presently received revenue. I know it is going to have an economic impact. But I have no way at the moment, sir, of estimating—I know we are talking about a large sum of money.

Chairman REUSS. You base your program on the need to combat the unemployment that will ensue from an energy shortage. Would these sums, which under your proposal would be given by the Federal

Government to the States, have to be spent on combating unemployment, or could they be spent on anything the State wanted?

Governor TRIBBITT. I didn't go, as you see, that far in my proposal. But those areas of percentages in the area of unemployment should certainly be looked at in the light of the category in which it was given to the Federal Government. In that area of unemployment, I would say, yes. The other category of the 10 percent I wasn't quite specific on. But the two other percentages I would say would fall in the category in which they are intended to be as per my formula, sir.

Chairman REUSS. If a State chose to use these Federal energy crisis revenue sharing funds to reduce its taxes, that wouldn't have much of an effect on combating unemployment, would it?

Governor TRIBBITT. I didn't look at it, sir, in the light of reducing taxes.

Chairman REUSS. But could not these funds be so used?

Governor TRIBBITT. That would depend, I would think, on the amount of money, if Congress should consider this favorably, that it would be the recipient of. But the purpose here is to take up the slack that the energy crisis is going to cause in my State and the other States by reason of the falling economy, to pick up the present levels of revenue presently received from taxes that we are presently imposing.

Chairman REUSS. So that the purpose would be to reduce State taxes over what they would otherwise have to be?

Governor TRIBBITT. Mr. Chairman, I don't know whether I can accept the word "reduced." But in lieu thereof of additional taxes—if in one of the smallest States we have a tremendous loss in revenue like I quoted here in the State of Pennsylvania, $4 million in its gasoline taxes, this would be a formula for coming to the Federal Government to satisfy the present status quo, Mr. Chairman. That is what I had reference to.

Chairman REUSS. Well, thank you very much, Governor Tribbitt, for your lively and informational statement. And I appreciate your coming down here.

Governor TRIBBITT. Thank you again, sir, for your courtesy in waiting for me.

Chairman REUSS. Thank you, sir.

We will now stand in adjournment.

[Whereupon, at 12:47 p.m., the subcommittee adjourned, subject to call of the Chair.]

[The following information was subsequently supplied for the record:]

RESPONSE OF HON. JOHN C. SAWHILL TO ADDITIONAL WRITTEN QUESTIONS POSED BY CHAIRMAN REUSS

Question. In priority allocations, what criteria will be used to determine the tough choices which will need to be made among various industries?

Answer. The criteria used are the ones set forth in the Emergency Petroleum Allocation Act of 1973 and incorporated in the Federal Energy Office Petroleum Allocation and Price Regulations, January 15, 1974. Specifically, they were related to the needs of people living in America for food, shelter, health and sanitation services, comfort, recreation, transport services for themselves and their goods, jobs to earn income and other factors.

2. *Specifically, what inter-industry priorities exist:*

Question a. The military has asserted its priority. Does the 300,000 barrels mentioned include oil for re-export to South Vietnam to resupply their stocks?

Answer. None of the fuel claimed by the military was to be re-exported to South Vietnam.

Question b. The *petrochemical* industries claim serious hardship. Will the new regulations include them? What priorities exist within the range of industries dependent on these products?

Answer. The new regulations have a special subpart, J, for petrochemical feedstocks which calls for the allocation of petrochemical feedstocks, to the maximum extent practicable, to assure petrochemical producers supplies equal to 100 percent of current requirements. The regulations also authorize allocation levels for petrochemical production of 90 percent of base period volume for propane and 100 percent of current requirements for butane. The regulations do not deal with the allocation of petrochemicals among the industries dependent on them, but the allocation levels authorized for petrochemical production should make it easier for petrochemical-using industries to get the supplies they need.

Question c. Consumer vs. industrial use: Is there a minimum consumer comfort level guaranteed, or will all necessary supplies be allocated to industry?

Answer. The regulations authorize 95 percent of base period volume for residential use of butane and propane. For middle distillates and residual fuel oil, the regulations authorize 100 percent of current requirements for space heating in residence and schools after taking into account a 6-degree F reduction in indoor air temperature. If the temperature reduction requirement causes exceptional hardships for certain individuals, State offices may grant relief. Some industries are authorized 100 percent of current requirements for some petroleum products. Others are authorized 100 percent of base period volume.

Question 3a. What is the actual capacity for switching back to coal from oil during 1974?

Answer. The realistic capacity is 280 thousand BBLs of residual oil per day.

Question b. How many plants have the capability?

Answer. Thirty-three plants on the East Coast have the realistic capability.

Question c. How much coal is available for the switch (i.e. mining and transportation capacity)?

Answer. The incremental surge capacity is 55 to 68 thousand tons per day.

Question d. What percentage of the residual shortfall does this represent?

Answer. About 34.5 percent of the estimated 812 thousand BBLs per day shortfall.

Question e. Do individual decisions to switch to coal depend on the assessment of how long the embargo will continue?

Answer. In most cases, no.

For additional information, see Attachment 1.

Question 4a. What provisions are being made to insure adequate regional distribution is achieved?

Answer. To meet imabalances that may occur in any product subject to the regulations, the FEO may order the transfer of specified amounts of product from one region or area to another.

Also, without prior FEO approval, refiners and importers are authorized to reduce monthly allocable supplies for any region or State by up to 5 percent and to increase the total quantity available in another region or State experiencing shortages significantly greater than in other parts of the nation, to meeting imbalances caused by unusual weather, seasonal demand or other circumstances beyond their control. Moreover, suppliers are not necessarily relieved of their obligation to serve purchasers in regions in which the suppliers have terminated or significantly reduced marketing and distribution activities.

Queston b. How do you plan to evaluate transport needs of Los Angeles and Houston versus heating needs of New England and Wisconsin?

Answer. The regulations authorize 100 percent of current requirements for passenger transportation services whether in Los Angeles, Houston or other cities and towns, or between one city and another. The regulations do not authorize allocation levels for individuals traveling in their own automobiles. Allocation levels for heating users, whether in New England, Wisconsin or elsewhere in the nation, are as given in 2(c) above.

ATTACHMENT 1

Approximately 54 utility plants on the East Coast are capable of converting back to coal from oil. Coal consumption would be approximately 163 thousand tons per day, but 649 thousand BBLs of residual oil per day would be saved. Attainment of this scale of conversion probably is not possible as the short term less than 1 year because of the inability to obtain the necessary quality and quantity of coal in 1974, and the environmental risk which would result.

It is estimated that the incremental surge capacity of the coal industry (which could fire short-term conversions) is 20–25 million tons per year for 1974 or 55–68 thousand tons per day which is equivalent to 225,000–275,000 barrels per day. This capacity can build up fairly rapidly. Savings of 280 thousand BBLs per day of residual oil from conversion under emergency conditions is therefore a realistic planning target for 1974.

In November 26, 1973, 26 utilities were selected based on technical and environmental constraints and urged by Mr. Simon to convert back to coal. An additional seven utilities were added to the list at a later date. If all 33 plants were to convert there would be a savings of approximately 280 thousand BBLs per day. The coal consumption if all 33 converted would be approximately 70 thousand tons per day.

To date 10 utilities have converted back to coal at a savings of 62 thousand BBLs per day and a coal consumption of 15.5 thousand tons of coal per day. An additional 13 utilities will convert as soon as coal is obtained or environmental variances are granted or both. This will mean an additional savings of 108 thousand BBLs per day and a coal consumption of 27 thousand tons of coal per day.

The remaining 10 plants will not convert unless a Federal order is issued to convert. Some companies need this to get releases from oil contracts, environmental standards, etc. Others will not convert unless forced to do so. These 10 would mean additional savings of 110.6 thousand BBLs of oil per day and a coal consumption of 27.6 thousand tons per day.

If all 33 utilities were to convert to coal this would represent 34.5 percent of the estimated shortfall (280 thousand BBLs/day saving divided by 812 thousand BBLs/day shortfall). This would mean, however, over 100 percent consumption of the surge capacity of the coal industry.

In most cases the individual decisions to switch to coal do not depend on the assessment of how long the embargo will continue. In many cases the decision is made on the basis of a dependable source of supply in the long run for power generation.

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