

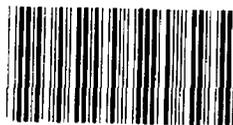
REPORT BY THE
Comptroller General
OF THE UNITED STATES

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Analysis Of The Energy And Economic Effects Of The Iranian Oil Shortfall

GAO analysis of readily available information indicates that:

- The net apparent shortfall to the United States is rather small, about 3 percent of U.S. consumption. But the shortfall to the U.S. consumer may be greater. No particular product or industry should be disproportionately affected.
- The shortfall is not large enough to result in a general activation of the International Energy Agency's allocation program and an individual activation by member nations is also unlikely. However, further major cutbacks by other countries could be disastrous.
- A potentially more serious consequence of the shortfall is higher oil prices. Rising prices due to the tight oil market will increase inflation and unemployment and decrease economic growth.
- The Department of Energy has a number of programs that possibly could be used to overcome the shortfall and meet its commitment to the IEA. Questions exist, however, as to how effective many of DOE's programs would be.
- The Iranian situation underscores the fact that the United States is not prepared to deal with supply disruptions. In the longer term DOE needs to strengthen its conservation programs, encourage more exploration and development in areas outside of OPEC, and move more rapidly to a renewable energy resource base.

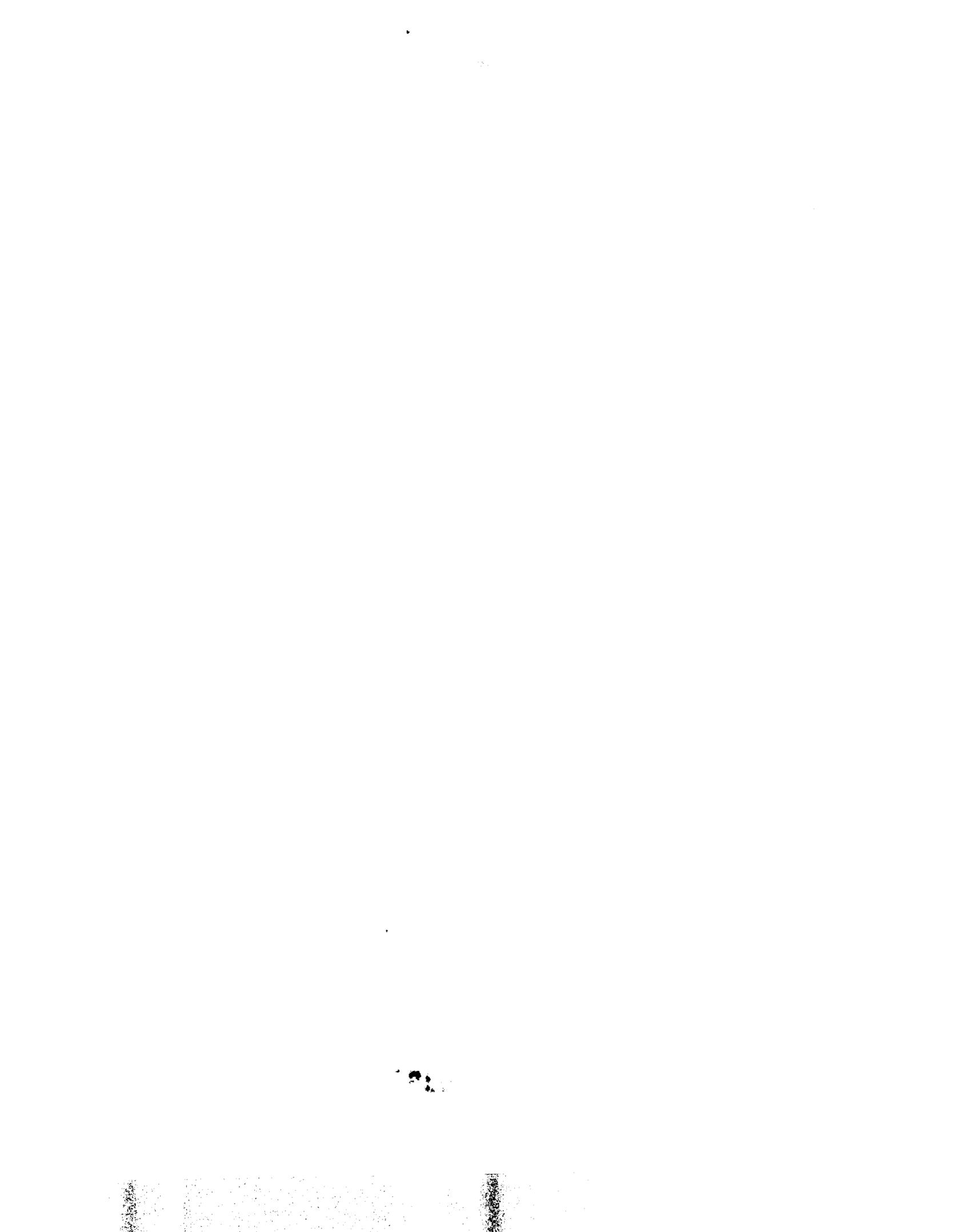


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Report

EMD-79-38
MARCH 5, 1979





COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-178205

The Honorable Henry M. Jackson
Chairman, Senate Committee on Energy
and Natural Resources

Dear Mr. Chairman:

This is in response to your request of February 13, 1979, for a quick analysis of the energy and economic effects of the Iranian oil situation, based on our experience and presently available data.

This letter summarizes the results of our analysis, and the enclosure provides the background and details.

We should stress that because of the urgency of this issue, the work was completed under an extremely tight deadline. To help meet that deadline, we did not subject the analysis to our standard documentation process, although the report has been intensively reviewed by staff. However, we believe there are a number of observations which will be useful to your Committee and the Congress.

The apparent net oil shortfall to the U.S. as a result of the Iranian cutoff appears to be rather small, about 500 thousand barrels per day (MBD), relative to our daily consumption of about 19 million barrels per day (MMBD). This is about 3 percent of U.S. consumption. From the initial production figures, it appears that Saudi Arabia and other countries have increased production to compensate for a portion of the Iranian shortfall. The situation is tenuous, however, because there may be little slack left in the system. Any additional cutbacks, from any source, could effect some serious domestic and international consequences. Major cutbacks, such as the loss of Saudi Arabian production, would be disastrous. It is also not clear, but the United States consumer might be experiencing more than the "apparent net" oil shortfall.

EMD-79-38

As a general observation, it would appear that the 500 MBD shortfall would not critically affect the United States. We should be concerned, however. The most common Iranian crude oil imported into the U.S. is "Iranian light," which can be refined into a large range of products. It would not appear, therefore, that any particular products, industries, or types of consumers will be disproportionately affected by the Iranian cutoff. From a geographic standpoint, however, normal transportation patterns indicate that the East Coast stands to lose a substantially greater share--about 5 percent--of refined products than other regions. This would be before any efforts to allocate supplies among customers and regions to more evenly distribute the shortfall.

There is one unresolved matter regarding allocation by the oil companies that concerns us. Some major oil companies have announced curtailments of gasoline sales to their customers in the 10 to 15 percent range while our figures indicate that many of these same companies are dependent upon Iranian oil for only 2 to 4 percent of supply. While this discrepancy is somewhat puzzling, there are possible explanations. One is that the oil companies are reallocating supplies to other countries which are more adversely affected than the United States. Another explanation is that some oil companies are stockpiling, in anticipation of more severe shortages. Another is that the companies are curtailing some sales to normal customers and shifting sales to the spot market where prices are now much higher than contract prices. Several oil companies reported to us that the cause of this discrepancy is the Department of Energy's pricing and allocation regulations and contend that the intricacies of the regulations result in allocation adjustments larger than the actual shortage. Department of Energy staff reports that this is a possibility. In any event, the point is that the U.S. consumer may be experiencing shorter supplies than any calculation of the Iranian net oil shortfall would indicate. The Committee and the Congress may wish to pursue this issue further with DOE and the oil companies.

The International Energy Administration (IEA) was

established after the 1973-74 oil embargo to allocate oil supplies to its 19 member nations in the event of severe shortages. Unless circumstances change there appears to be little likelihood for a general activation of the IEA allocation program. The amount of the shortfall, which is about 5 percent of IEA member nations requirements, is not large enough to reach the 7 percent threshold which could cause triggering of the sharing program nor is it likely to be that large as long as the other producing countries maintain their increased output. Of course, Iran reportedly is now resuming production, but there is uncertainty involving timing and amounts.

Many IEA members are experiencing shortfalls above 7 percent and an individual activation of the program by these countries is a possibility. The enclosure notes several reasons, however, why a country might be reluctant to activate the program if the shortfall is only slightly above the 7 percent threshold. If the countries that are most dependent upon Iranian oil activate the program, the U.S. would have to share oil supplies with them; but these amounts would be rather small. We estimate about 150 MBD under one scenario, which the U.S. should be able to absorb without severe repercussions.

The IEA membership has agreed to voluntarily reduce consumption by 5 percent. This is an attempt to generate slack in the world oil market in order to combat the upward pressure on oil prices and hopefully minimize the economic damage to oil importers.

A potentially more serious element of the problem than the volumes involved is the effect on world oil prices. The timing of the world oil shortfall is causing oil prices to rise and will increase inflation and unemployment. We roughly estimate, using the Data Resources, Inc., quarterly model, and under a fairly conservative assumption, that average oil prices will rise by 7 percent over the 10 percent increase previously announced for 1979. However, the producing countries could take advantage of the extremely tight oil market and raise prices even further. An effect of a 7 percent price increase would be to raise unemployment by 100,000 in 1979 and another

100,000 next year. The loss in gross national product would amount to about \$160 this year for a family of four and a loss of about \$300 in 1980. The inflation rate would increase by 0.7 percent in 1979 and 0.4 percent in 1980. The effects are not inconsequential, especially when viewed in the current economic context of increasing inflation and probable growth slowdown.

Our analysis of the model output indicates that rising prices will result in a demand reduction of about 200 MBD. However, the recent decision by IEA members to voluntarily reduce consumption by 5 percent may require the U.S. to reduce its consumption by about 900 MBD. It is apparent that some conservation actions will be needed to comply with the agreement.

DOE has a large number of programs that possibly could be used to overcome the shortfall such as fuel switching, the use of the Strategic Petroleum Reserve, voluntary and mandatory conservation, and gasoline rationing. Questions exist, however, as to how effective some of these programs would be in conserving oil in the short run. Some programs would either not effectively conserve oil in the short run or have not been adequately prepared for implementation. The fuel switching program will have to overcome many institutional and administrative barriers and probably cannot contribute significantly for six to nine months. The capability of the Strategic Petroleum Reserve at this point is very limited. The savings potential of the voluntary conservation programs is uncertain. The mandatory conservation programs, of course, involve problems such as inconveniences with weekend gas station closings and enforcing building temperature restrictions. More extreme actions, like rationing, of course, involve a great deal of cost and inconvenience. The enclosure notes a number of specific problems with many of the individual proposals.

As unprepared as DOE is to implement many of these programs, some may have to be activated to combat the oil price increases. While the volumes involved in the Iranian shortfall do not appear overly serious, on the surface, there is the larger potential for economic damage resulting from the large price increases being charged by some oil exporters and the high prices being caused by abnormal demand in the spot market. Tight

markets are causing these price increases and continuing supply scarcity could produce even higher prices and economic setbacks which are more serious than those analyzed in the enclosure. We could even be experiencing a permanent price increase, as occurred after the 1973 embargo.

There is a direct connection between demand constraint in this country and world oil prices. We buy about 25 percent of the world's internationally traded oil. An effective program of demand restraint would go a long way toward creating slack in the world market which would lower the rate of price increases.

The important point, however, is that we have not and are not addressing the conservation issue adequately. This underscores the need to focus on our conservation programs.

The Government needs to provide consistent, clear direction on the role energy conservation is to play in National energy policy. In a letter report to the Chairmen of energy-related Committees and Subcommittees dated February 13, 1979, (EMD-79-34), I noted that the three overriding problems concerning energy conservation are:

- The lack of consistent, specific planning which clearly identifies what contribution energy conservation is to make in the overall national energy plan.
- The lack of an aggressive, coordinated effort to conserve energy in Federal operations and facilities.
- The failure of the administration to promptly develop, and have approved by the Congress, emergency energy conservation and gasoline-rationing plans.

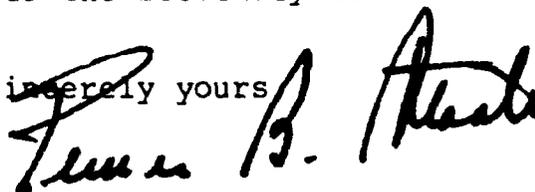
In the final analysis, it appears that there are sufficient options available to deal with the Iranian shortfall. A disturbing factor which has not been widely recognized, however, is that the Iranian situation further concentrates the free world's oil supply. While we may be able to manage with the loss of Iranian production, there is virtually no more slack left in

the system. Another 1 million barrels per day of lost production would be especially serious. That amount could trigger the IEA general sharing plan. Losing Saudi Arabian production, which would cut the free world's oil supply by 30 percent, would be disastrous.

This underscores the importance of action in three areas where GAO has done previous work and made recommendations. First, the Government needs to get its conservation act together. There is no reason to believe that the world is not going to continue to experience periods of tight supply and upward pressure on prices. The time simply is here to bite the bullet on conservation. Secondly, we should encourage more exploration and development from areas outside of OPEC. In a report to the Congress dated January 3, 1978, entitled, "More Attention Should Be Paid to Making the U.S. Less Vulnerable to Foreign Oil Price and Supply Decisions", (EMD-78-24), we recommended that the Departments of State and Energy seriously develop plans and improve security of U.S. supplies and submit the proposed initiatives to the Congress for consideration. Both agencies have neglected to take such actions and we are aware of no effort underway to do so. Lastly, national energy policy should be more focused to achieve an orderly transition to an economy based upon alternative sources of energy. We urgently need to move more rapidly to a renewable energy resource base and adjust the emphasis of our programs accordingly.

As agreed with your staff, copies of this analysis are also being sent to the Chairmen of other congressional energy-related committees and subcommittees. A copy is also being furnished to the Secretary of Energy.

Sincerely yours



Comptroller General
of the United States

Enclosure

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ABBREVIATIONS

MBD or mb/d	Thousand barrels per day
MMBD	Million barrels per day
IEP	International Energy Program
IEA	International Energy Agency
OPEC	Organization of Petroleum Exporting Countries
GNP	Gross National Product
DOE	Department of Energy
SPR	Strategic Petroleum Reserve
API	American Petroleum Institute
PAD	Petroleum Administration for Defense Districts
DRI	Data Resources, Incorporated
TCF	Trillion cubic feet

CHAPTER ISUMMARY OF OBSERVATIONSIntroduction

Senator Henry M. Jackson, chairman of the Committee on Energy and Natural Resources, requested on February 13, 1979, that GAO urgently analyze the energy and economic effects of the Iranian oil shortfall on the basis of our existing experience and presently available data. In the interest of timeliness, the analysis was not subjected to our standard documentation process, but it has been intensively reviewed by staff. We believe there are a number of observations which will be useful to the Committee and the Congress.

The Size of the Shortfall

- The net world shortfall, after increased production from Saudi Arabia and other countries, appears to be about 2.5 million barrels per day (MMBD)--about 5 percent of free world consumption.
- The U.S. share of the shortfall appears to be about 500 thousand barrels per day (MBD)--about 3 percent of U.S. consumption.
- The apparently small shortfall could become more serious, however, in that it would take only one million barrels per day of additional cutbacks from any source to trigger the general IEA oil sharing agreement.
- The potential impacts of the Iranian situation on price are more serious than those resulting from the production shortfall.
- Several members of the International Energy Agency (IEA) could have a shortfall greater than 7 percent. Japan, Italy, Belgium, the Netherlands, Spain, and New Zealand are particularly dependent.
- Small U.S. importers and refiners appear to be experiencing more difficulty than larger companies in obtaining oil supplies.
- The most common Iranian crude oil imported into the U.S., "Iranian light," is a moderately

light oil that can be refined into a wide range of products. We do not expect that any particular industries or consumers will be disproportionately affected by the Iranian oil cutoff. However, slightly less gasoline and somewhat more residual oil may be produced.

- We have noted an apparent discrepancy between the size of refined product cutbacks we would expect from the Iranian shortfall and the larger gasoline allocation reductions being announced by a number of major oil companies in the U.S. The companies may be redistributing crude to other nations, stockpiling for future price increases, selling on the spot market for higher profits, or may be caught with temporary excess demand caused by DOE price and allocation controls. Any or all of these may be happening and should be looked into further.
- It appears that the East Coast stands to lose a substantially greater percent of refined products than other regions. Based on 1977 transportation patterns and in the absence of compensating action by the oil companies, the East Coast might lose approximately 5 percent of its refined products compared with 1 percent for the West Coast and less than 1 percent in the Gulf and Mid-West. The West Coast has the added option of substituting Alaskan oil.

International Aspects

- The conditions are not present for an International Energy Agency (IEA) collective triggering of the International Energy Program (IEP) on the basis of the current shortfall. The amount of the current shortfall (5 percent) is not large enough to reach the 7 percent threshold. Oil producing nations other than Iran would need to cut back an additional 1 MMBD to equal 7 percent of free world consumption. This would be considerably less than the extra 2.5 MMBD they are currently producing.
- There is a greater chance of an individual triggering of the IEP by a few nations that are more dependent on Iranian oil. However, these nations would generally be reluctant to activate the sharing agreement because:

- a. By invoking the IEP a nation would be formally declaring that it is in serious straits and would need to depend on other nations. The economic and political consequences of such a declaration could be serious and most governments would probably be reluctant to do so. This is especially so if, as suspected, the multinational oil companies are allocating supplies to help other more vulnerable customers.
- b. By invoking the IEP now a nation may be setting a precedent it may wish to avoid. It might restrict its options in the event of a future crisis--especially a politically motivated embargo against the U.S.

--Pressure for activation could build up by late spring or early summer when it is normally time to start replenishing stocks.

--If there is an individual activation of the IEP by one or more nations, the U.S. would have to divert oil to these countries.

--The IEA members heavily dependent on Iranian oil are Belgium, the Netherlands, New Zealand, Spain, Japan, and Italy.

--The oil requirements of the first four nations are so small that the U.S. share of the diversion would be only 60 to 70 thousand barrels per day (MBD)--hardly a noticeable amount. Japan and Italy have larger requirements. If they are added to the first four, the U.S. requirement would climb to about 130 to 140 MBD, still less than 1 percent of our daily consumption. While this would undoubtedly be felt, the nation's energy system should have enough flexibility to forego such small additional amounts without significant strain, or certain conservation measures could be imposed to take up the slack.

Effects on U.S. Economy

--The tightening of the world oil market as a result of the lost Iranian production is causing prices to rise. Spot prices have risen to about \$23 per barrel and some OPEC

countries have independently increased prices about 15 percent. For 1979, we estimate the effect to be an increase of 7 percent above the December OPEC increase which would average 10 percent in 1979. But this is only a rough estimate. OPEC could take advantage of the shortfalls in oil markets and raise prices even further.

--The Data Resources, Inc., quarterly model was used to measure the effect of a 7 percent increase on the nation's economy. It revealed, among other things, that in 1979:

--GNP loss is \$8.5 billion

--The inflation rate increases by .7 percent

--The unemployment rate increases by .1 percent

--Oil demand drops by 200 MBD.

--These effects are not inconsequential, especially when viewed in the present economic context of increasing inflation and probable growth slowdown.

--The economic facts of lower growth and higher prices reduce demand by about 200 MBD and therefore "eat up" 40 percent of our 500 MBD shortfall. The remaining 300 MBD shortfall would have to be made up in other ways. There is also the very important question as to whether demand reduction actions should be implemented to generate slack in the world oil market and thereby mitigate further price increases.

Government Options

--The Government has a large number of programs which could plausibly be used to overcome the shortfall. However, most would either not effectively conserve oil in the short run or have not been adequately prepared for implementation. These other plans deserve coordinated development so they can be implemented now if need be and will be ready in the event of future supply disruptions. Just as important, perfecting these programs and putting the appropriate ones into effect will lower demand, produce slack in tight oil

markets, and help prevent price increases.

- The Department of Energy's first line of defense against an oil import reduction is voluntary conservation. DOE estimates that it can save about 250-700 MBD through various voluntary programs. The major voluntary programs are:
 - Reduce personal gasoline use
 - Reduce commuter gasoline use
 - Enforce the 55 mph speed limit more vigorously
 - Reduce heating/cooling in buildings.
- These programs would be promoted through press releases, energy-saving tips, Presidential appeals, and a letter writing campaign to enlist the cooperation of governors, local officials, and business leaders.
- While voluntary conservation may indeed eliminate or substantially reduce the shortfall, the length of time the public will cooperate and the size of the savings are uncertain. Specific problems involved with each of these voluntary programs are cited in Chapter V of this study.
- One suggestion to help meet the oil shortfall is to use the Strategic Petroleum Reserve either directly or by diverting oil under contract but not yet delivered. About 300 MBD is scheduled to be delivered in March. This probably could be diverted if the decision is made immediately. However, there have been virtually no deliveries contracted for beyond March and therefore it is not certain whether the oil will be available at reasonable prices under present market conditions. Using the 70 million barrels already in storage may be a rather extreme solution to the problem.
- Another option is fuel switching. In addition to the coal conversion program already in progress, this primarily involves the use of natural gas as a substitute for oil and the "wheeling" of coal-generated electricity. DOE estimates the potential of natural gas substitution alone to be 500 MBD but this will require the removal of considerable

legal/regulatory impediments. DOE staff does not expect significant contributions from these options until late summer or early fall.

--A more stringent option is mandatory conservation. DOE is considering three programs:

--Weekend gasoline station closings

--Building temperature restrictions

--Advertising lighting restrictions

--DOE staff estimates the total potential savings from these measures to be about 800 MBD. Achieving this reduction would cost the Federal Government \$5 million and State and local governments \$17 million to implement and enforce.

--Although many of the details of DOE's mandatory conservation programs are unknown, it appears that they have the potential to eliminate or substantially reduce the shortfall. However, the extent to which these measures are enforceable or will achieve the level of oil savings DOE predicts is unclear. Further, some mandatory conservation measures damage a few industries greatly.

--The "ultimate" conservation option is gasoline rationing. This would "solve" the problem in that it would limit sales to the amount of available supplies. The economic costs and inconveniences of such a program are, of course, considerable. Rationing is the type of program that should be ordered in critical emergencies. There may well come a time and a crisis when gasoline rationing is needed, but the problems caused by the Iranian cutoff do not appear to be that serious.

In the final analysis, it appears that there are sufficient options available to deal with the Iranian shortfall--at least from a volume standpoint. Prices may be another matter, however. The effect of substantial price increases could be quite damaging. Another disturbing factor, which has not been widely recognized, is that the Iranian situation further concentrates the free world's oil supply. While we may be able

to manage with the loss of the Iranian production, there is virtually no more slack left in the system. Only another 1 million barrels per day of free world production cutbacks could trigger the IEA general oil sharing agreement. That could be serious. The consequences of losing a major source such as Saudi Arabia which would constitute a loss of 30 percent of the free world's oil supplies--would be disastrous.

This underscores the importance of action in two areas where GAO has done previous work and made recommendations. First, the Government needs to get its conservation act together. There is no reason to believe that the world is not going to continue to experience periods of tight supply and upward pressure on prices. The time simply is here to bite the bullet on conservation. Secondly, we should encourage more exploration and development from areas outside of OPEC. In a report to the Congress dated January 3, 1978, entitled, "More Attention Should Be Paid to Making the U.S. Less Vulnerable to Foreign Oil Price and Supply Decisions", (EMD-78-24), we recommended that the Departments of State and Energy seriously develop plans and submit the proposed initiatives to the Congress for consideration. Both agencies have neglected to take such actions and we are aware of no effort underway to do so. Lastly, national energy policy should be more focused to achieve an orderly transition to an economy based upon alternative sources of energy. We urgently need to move more rapidly to a renewable energy resource base and adjust the emphasis of our programs accordingly.



CHAPTER II

THE SIZE OF THE SHORTFALL

As of March 2, 1979, Iran is exporting no oil, having stopped the flow completely in late December last year. Iran's exports were slightly over 5 million barrels per day (MMBD), about 10 percent of non-communist oil consumption. Iran provided a similar proportion of the International Energy Agency's (IEA) consumption, about 3.4 MMBD in 1977. According to our estimates, in 1977 the U.S. imported 774 thousand barrels per day (MBD) of crude and products from Iran of which 240 MBD of products came indirectly from Caribbean refineries. On this basis, the gross U.S. shortfall can be considered about 800 MBD.

Various oil exporting countries have raised production to offset the loss. There are any number of ways to calculate how much is being made up, and the present situation, to say nothing of the future, is unclear. The Department of Energy's best information is that 3 MMBD are currently being replaced. Of this total, 1.5 MMBD are being made up by OPEC countries other than Saudi Arabia. Saudi Arabia's production increase is based, however, on slightly more than 10 MMBD which was experienced during early January. Since then, Saudi Arabia has announced intentions of maintaining a monthly average production of no more than 9.5 MMBD. Consequently, the net shortfall should be around 2.5 MMBD unless Saudi Arabia, Kuwait, or other exporters lift their administratively imposed production ceilings. The U.S. share of the net world shortfall would be about 400 MBD. However, DOE and other analysts calculate our country's shortfall at about 500 MBD. This 500 MBD level appears plausible to us since some oil might be diverted by the multinational oil companies to more distressed countries. The net U.S. shortfall, therefore, should be about 500 MBD or 3 percent of U.S. oil consumption.

U.S. Oil Importers

In 1977, the U.S. imported an estimated 774 MBD of petroleum directly and indirectly from Iran. Of that, 530 MBD of crude oil and 5 MBD of products were imported directly, while 239 MBD--or nearly 1/3 of the total--arrived from the Caribbean as refined products. Seventy-eight percent of Caribbean imports to the U.S. came from Amerada Hess' Virgin Islands refinery.

Examining 1977 or "business as usual" import patterns provided us with a basis to determine what importing companies, refineries, products, and geographic areas would be affected by a loss of Iranian oil.

While most major U.S. oil companies imported substantial amounts of Iranian crude, they generally have more alternatives than smaller companies to maintain their oil supply.

Table 1 shows the amount each company imported in 1977 and how dependent each company was on Iranian oil. The five energy companies who imported the largest percent of their total oil supply from Iran are Delta Refinery (70%), Amerada Hess (40%), Energy Coop (35%), Atlantic Richfield (17%), and Marathon (10%). While most major U.S. oil companies, with the possible exception of Gulf, import large amounts of oil from Iran, they also obtain large quantities of oil from other sources. Therefore, the loss of Iranian oil is likely to result in a proportionally smaller supply loss. Further, the major international companies have more flexibility to swap and otherwise move oil around on the international market to minimize supply discontinuities.

Many importers have been forced to terminate contracts due to cutbacks in Iranian oil. For example, one oil company blamed Iranian supply cutbacks for their failure to renew a yearly supply contract with one refiner 2 days before it was up for renewal. However, the extent to which companies may be taking advantage of tight supplies to receive premium prices for both contract and spot marketed oil is unknown.

U.S. Refiners

Both small and large refiners are experiencing difficulty in maintaining their crude oil supply as a result of the Iranian production cutoff. However, the very small refiners are less able to cope with a tightening crude oil market than their larger competitors.

Of the 302 U.S. refineries in operation during 1977, 40 received crude inputs from Iran. Of the refineries receiving oil from Iran, about 1/3 have refining capacities greater than 200 MBD. Several larger refiners have recently complained about supply shortages. An Atlantic Richfield official told us that of the usual 800 MBD refinery input, 100 MBD

TABLE 1

IRANIAN IMPORTS BY U.S. COMPANIES
(1977)

<u>Company</u>	<u>Barrels/day</u>	<u>Percent of Company's Imports</u>	<u>Percent of Company's Total Supply</u>
Delta	3,893	70	70*
Energy Coop	36,377	35	35*
Amerada Hess	232,612	40	30
Atlantic Richfield	122,164	33	17
Marathon	45,353	16	10
Exxon	93,161	15	7
Ashland	30,373	7	7
Chevron	50,855	7	5
Shell	35,720	8	4
Sohio	17,064	6	4
Amoco	22,146	6	3
Mobil	14,857	4	2
Getty	3,978	4	1
Coastal States	1,697	1	1
Texaco	3,540	1	.3

* These companies had no domestic production.

Source: Derived by GAO from unpublished Department of Energy data and "Petroleum Growth Companies," Petroleum Outlook, November 1978, John S. Herold, Inc., Greenwich, Connecticut, p. 40.

has been cut off due to the loss of Iranian production. In 1977, 31 percent of the ARCO's East Coast and 15 percent of their Houston crude input were imported from Iran. Exxon's New Jersey and California refineries derived respectively 19 percent and 33 percent of their crude input from Iran. However, large refineries have options available to them to reduce their supply shortage. They generally have substantial storage facilities so they can draw down reserves. All but two of the 40 refineries receiving Iranian oil have catalytic crackers, thus it appears that many of them will be able to process less optimal crude. Larger refiners generally have access to the international oil market, can use oil from other refinery locations, and can better afford to pay premium prices for crude.

The extent to which smaller refiners are being affected by the shortfall is unclear. While our data shows that many medium to small refineries imported oil directly from Iran (nearly 1/3 of refineries importing Iranian oil had capacities under 100 MBD), many other small refineries are affected by the tightening of the light crude market. The smallest refineries (under 40 MBD capacity) are generally at the end of the swapping chain and thus have little flexibility to reduce their shortfall. Small refiners seem to be the hardest hit by the shortfall due to one or more of the following reasons:

- contracts with suppliers have been terminated;
- they cannot locate suppliers in either the contract or spot market;
- they do not have the expertise to deal in the international energy market;
- they cannot afford premium contract and spot market prices;
- some do not have the processing equipment needed to use the heavier, higher sulfur crude which is still available.

The Department of Energy staff reported that many small refiners have complained about difficulties in obtaining oil. They claim to be forced to cut production. Ten refineries, which had an average capacity of 21 MBD, received a total of about 75 MBD in allocations from the Department of Energy buy/sell program between

December 23, 1978, and February 7, 1979, because they were unable to find suppliers. Eighteen refineries (some of which are the same) have pending applications for allocations. While we do not address the full tradeoffs of the allocation program, it appears that the Department of Energy's program has been keeping some small refineries operating that otherwise might have suffered serious losses.

Products Affected

We do not expect that any particular industries or consumers will be disproportionately affected by the Iranian oil cutoff. However, slightly less gasoline and more residual fuel oil and other heavy products may be produced.

The most common Iranian crude imported into the U.S., "Iranian Light" is moderately light (API gravity 33.5) and fairly sour (sulfur by weight 1.4 percent). This type of crude can be used to produce a full range of products. Therefore, when crude is cut back, it is generally expected that all products would be cut back roughly proportionately. However, the Iranian induced shortage of light crude may force some refiners to switch to processing heavier crudes. The use of heavier crudes may result in about 1 to 2 percent less gasoline production.

While various major companies were dependent on Iranian imports for 2 to 4 percent of their total U.S. crude supply, several majors have announced curtailments of gasoline sales in the 10 to 15 percent range. These gasoline cutbacks seem quite large in comparison to the crude shortfall. Time limitations have not permitted a detailed examination of why product curtailments should be so out of line with apparent crude losses. Several explanations have been offered. Probably the simplest is that the companies are diverting some oil to regular foreign customers--including their own subsidiaries--who were more dependent on Iranian oil than their U.S. counterparts. Another is that the majors are diverting oil to the spot market where prices are much higher. If this is happening, it could lower their crude supply and force greater final product curtailments. A final explanation, one offered by the companies and which DOE staff thought possible, concerns DOE's pricing and allocation regulations. In essence, the regulations cause some refiners' prices to be lower, causing a rush for their products by middlemen. This temporary excess demand forces the

companies to allocate among customers. This explanation, however, does not account for why refiners may be producing less gasoline. While we have not had time to pursue this question to a satisfactory conclusion, the Committee and the Congress may wish to do so.

The supply of residual fuel may increase slightly as a result of some refiners switching from lighter to heavier crude. Since the heavy crude market is not as tight as the market for light crudes, the utility industry should be less affected by the shortfall than other industries. Some utilities also have the option of switching to gas or coal.

A final concern raised by the Iranian cutoff is that small refiners will not be able to fulfill their role of suppliers of fuel and petrochemical feedstocks needed by local industry. A prolonged shortfall might, therefore, have serious adverse but localized effects in the absence of an allocation program.

While there appears to be some evidence of production cutbacks in refineries of all sizes, of perhaps greater concern at this point is the future price of home heating oil. The effects of rising fuel prices are discussed in Chapter IV, EFFECTS ON THE U.S. ECONOMY.

Regional Impacts

Tables 2, 3, and 4 show the amount of crude and products imported from Iran by PAD districts. All regions with the exception of PAD 4, import substantial amounts of Iranian oil and would thus be affected by the oil cutoff. With regard to refinery output, based on 1977 importation patterns, the East Coast stands to lose a substantially greater percent of refined products than the two other affected regions.

In the absence of supply compensating actions by the oil companies, the East Coast might lose approximately 5 percent of its crude and refined products compared with the West Coast's 1.4 percent loss and the Gulf and Midwest losses of under 1 percent. The West Coast has the added option of substituting Alaskan oil, but that would entail relaxing some environmental standards.

TABLE 2

DIRECT IRANIAN PETROLEUM IMPORTS
INTO THE U.S. BY DISTRICT
 (1977)
 (thousand 42 gallon barrels)

	<u>PAD</u> <u>I</u>	<u>PAD</u> <u>II</u>	<u>PAD</u> <u>III</u>	<u>PAD</u> <u>IV</u>	<u>PAD</u> <u>V</u>	<u>TOTAL</u>
Crude	171.5	74.9	183.6	0	99.8	529.8
Motor Gas	--	--	--	--	.1	.1
Liquid Gas	--	--	.8	--	--	.8
Distillate Fuel	.7	--	--	--	--	.7
Residual Fuel	3.5	--	--	--	--	3.5
Total Imports into U.S.	175.7	74.9	184.4	0	99.9	534.9

Source: GAO tabulation from unpublished DOE data.

PETROLEUM ADMINISTRATION FOR DEFENSE (PAD) DISTRICTS

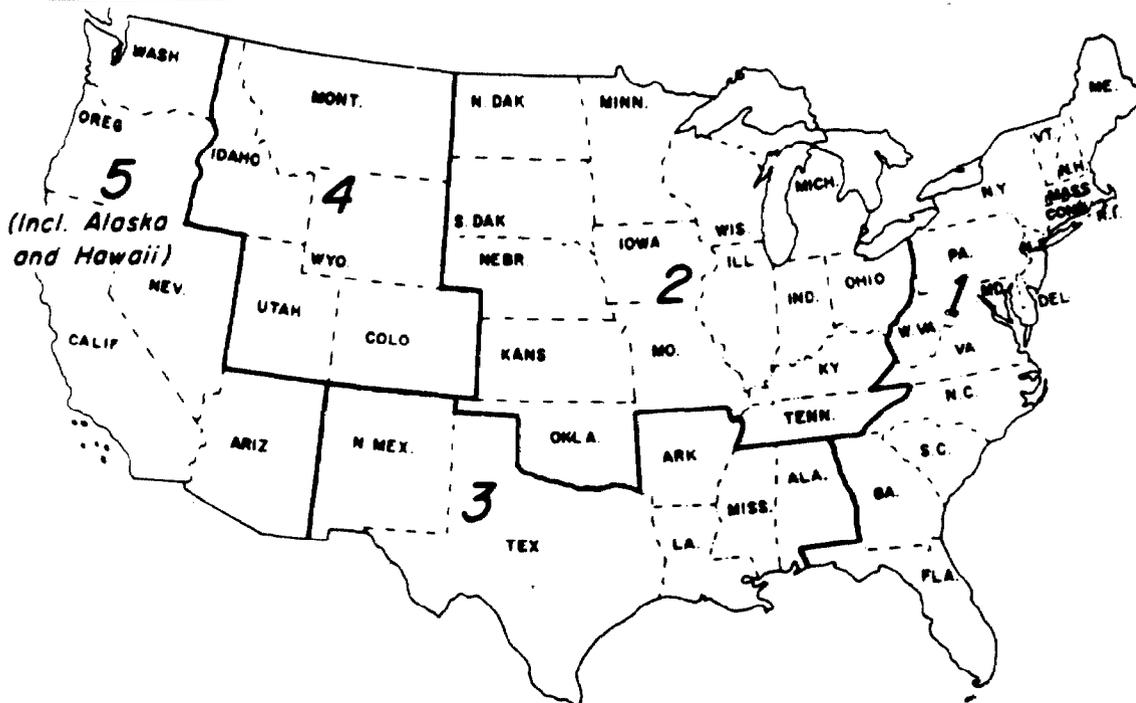


TABLE 3

ESTIMATED AMOUNTS OF CARIBBEAN PETROLEUM PRODUCTS
REFINED FROM IRANIAN CRUDE OIL IMPORTED
INTO THE U.S. BY DISTRICT

(1977)

(thousands of barrels per day)

	<u>PAD</u> <u>I</u>	<u>PAD</u> <u>II</u>	<u>PAD</u> <u>III</u>	<u>PAD</u> <u>IV</u>	<u>PAD</u> <u>V</u>	<u>TOTAL</u>
Motor Gas	39.0	0	.3	0	0	39.3
Distillate	47.9	0	.4	0	0	48.3
Residual	129.4	0	.8	0	.1	130.3
Unfin/Petro.	.5	0	1.7	0	.2	2.4
All Others	<u>18.1</u>	<u>0</u>	<u>.1</u>	<u>0</u>	<u>.9</u>	<u>19.1</u>
Total	234.9	0	3.3	0	1.2	239.4

Source: GAO estimates using DOE and company unpublished data.

TABLE 4

ESTIMATED 1977 TOTAL DIRECT AND INDIRECT
IMPORTS FROM IRAN INTO U.S. BY DISTRICT
(thousands of barrels per day)

	<u>PAD I</u>	<u>PAD II</u>	<u>PAD III</u>	<u>PAD IV</u>	<u>PAD V</u>	<u>TOTAL*</u>
Motor Gas	39.0	0	.3	0	.1	39.4
Distillate	48.6	0	.4	0	0	49.0
Residual	132.8	0	.8	0	.1	133.7
Unfin/Petro.	.5	0	1.7	0	.2	2.4
All Others	18.1	0	.9	0	.9	19.9
Total Products	<u>239.0</u>	<u>0</u>	<u>4.1</u>	<u>0</u>	<u>1.3</u>	<u>244.4</u>
Crude	171.5	74.9	183.6	0	99.8	529.8
Total Shipments	<u>410.5</u>	<u>74.9</u>	<u>187.7</u>	<u>0</u>	<u>101.1</u>	<u>774.2</u>

Source: GAO estimates using DOE and company unpublished data.

* Differences among Tables 2, 3 and 4 entries due to rounding.



CHAPTER III

INTERNATIONAL ASPECTS

Likelihood of Triggering the IEP Oil Sharing Plan

If other oil exporters maintain their present production, we see little chance for a collective triggering of the International Energy Program (IEP). As we discussed earlier, about half of previous Iranian exports are being made up by other exporters. Since Iran supplied about 10 percent of the non-communist world's oil, the net shortfall is about 5 percent. This is well under the minimum 7 percent shortfall to the IEA which would be necessary to trigger the general oil sharing agreement.

There is a greater chance that the oil sharing plan could be activated by one or more nations enduring substantial hardship due to disproportionate dependence on Iranian oil. But there are several reasons why nations would be reluctant to activate the plan. A number of IEA countries imported more than 20 percent of their oil from Iran. These include Belgium, New Zealand, the Netherlands, and Spain. Of these, Spain's 1977 import dependence was highest, about 26 percent. The only really large consuming nation which approaches the 20 percent dependence level is Japan which depended on Iran for about 17 percent of its oil in 1977, or about 870 MBD.* Despite these impressive levels of dependence, there are some important reasons why neither Japan nor any other nation has invoked the oil sharing plan.

When a nation loses oil equivalent to 7 percent or more of its domestic consumption, it can invoke the oil sharing plan. However, it must first reduce its domestic consumption by 7 percent through conservation before it can receive oil from other member countries. Thus, a nation must lose substantially more than 7 percent before it would consider activating the oil sharing agreement on its behalf.

*/Italy was dependent on Iran for slightly less than 20 percent of consumption (293 MBD), but Italy's domestic consumption was about 1.5 MMBD while Japan's domestic consumption was a bit more than 5.0 MMBD.

Take Japan as an example. Japan's gross shortfall, 17 to 18 percent of consumption, would shrink to a net shortfall between 7 to 10 percent after receiving her share of other exporters' additional production. In other words, she would be at or only marginally above the point where she could benefit from the plan, and this is before any actions the multinational oil companies might take to allocate additional supplies to her. Of course, by invoking the IEP, Japan would be formally declaring that she was in serious straits and needed to depend on other nations. Needless to say, no government relishes admitting that it is in trouble and asking other nations for aid. The domestic political consequences of such a declaration could be serious, and the amount of oil Japan could receive would be equal to only 3 percent or less of her consumption.

Invoking the oil sharing plan now would also be setting a precedent that many nations may prefer to avoid. Being a recipient of international aid now to cover a fairly small current deficit would limit a nation's freedom to react in the event of a more serious situation--especially a politically motivated embargo--in the future against the United States.

The fact is that the IEP was designed to deal with such politically inspired embargoes rather than a general, nonpolitical shortage. In the event of an embargo, the IEA plan would allocate available oil among the members, thereby at least partially frustrating the embargo and taking over a function which the multinational oil companies may no longer be able to do. The present shortfall is not directed against any particular country, and so neither the companies nor the IEA member governments are under political pressure from the oil exporting countries to distribute available oil in any specific way. Under these circumstances, we can expect the multinational oil companies to allocate some supplies to vulnerable customers who are willing to pay the price.

While no nations seem anxious to activate the oil sharing plan today, pressure for activation could well begin to build up by late spring or early summer. The warmer months are usually a time for replenishing stocks which have been drawn down during the winter. If the Iranian cutoff persists, little if any stock buildup will be possible. If nations foresee a winter of cold, dark homes, one or more of them may reconsider their positions. One constructive action the IEA has taken is to agree to a planned demand reduction of

5 percent among the members. IEA-wide demand restraint would take a great deal of pressure off spot market prices which would in turn give OPEC countries less opportunity to raise official prices. Coordinated demand restraint would also help avoid triggering the oil sharing agreement, an outcome most nations would prefer.

Effects of Oil Sharing on the U.S.

While a collective activation of the IEA general oil sharing agreement could not occur under the existing shortfall, an additional curtailment of about 1 MMBD would be sufficient to qualify under the Agreement. In that event it could cause the U.S. considerable hardship. If the agreement were put into effect, all member countries would have to decrease consumption by 7 percent. The United States would have to cut oil use by about 1.3 MMBD, nearly three times the current shortfall. The actual U.S. import shortfall would be no more than 800 MBD. We would have to ship about 500 MBD of oil to other nations with shortfalls above 7 percent which would have a legitimate claim to that oil.

An individual triggering of the oil sharing plan is, in our opinion, somewhat more likely by those nations more dependent on Iranian oil. To illustrate selective triggering's impact, suppose that the four nations most dependent on Iranian oil (Belgium, the Netherlands, New Zealand, and Spain) along with Japan and Italy invoke the plan. Japan and Italy are included because of their substantial Iranian import dependence and large consumption. The combined shortfall of the first four would only amount to about 510 MBD. The U.S. would have to make up about 60 to 70 MBD, a very small part of our total consumption of 19 MMBD. If Italy and Japan are included, the total would climb to about 130 to 140 MBD, still less than 1 percent of our daily consumption. Any additional oil lost through this mechanism would certainly be a nuisance, but the Nation's energy system should have enough flexibility to forego such small additional amounts without significant strain.

International Implications of Oil Sharing

The implications of activating the IEA oil sharing agreement may well depend on both its actual effects and the members' perceptions of its efficacy. Any country which triggered the oil sharing agreement

would receive larger shipments of oil at the expense of other members. However, this would immediately show the degree of vulnerability these nations have to oil interruptions and reveal the inadequacies of member nations' programs for oil demand restraint. This could in turn precipitate a loss of confidence in both the economies and the governments of these countries.

While the oil sharing agreement may work for a short period of time, donor nations could expect political protests from their citizens at having to suffer a worse shortage to help out other countries. Political pressures could be quite severe. This would vary from country to country depending on, among other things, different degrees of reliance on oil as an energy source, differences in efficiency and severity of demand restraint actions, and different rates of economic growth--none of which are, of course, corrected by oil sharing.

One of the purposes of the IEP is to preclude a bidding war among the membership for scarce oil supplies. While the IEA nations may not bid against each other, the third world and industrialized non-member nations would be in the market and so bidding for scarce oil would probably still exist and prices would rise. There might well be disagreement among the member countries over whether the appropriate demand restraint actions had been taken or whether the appropriate amounts of oil were being relinquished or delivered.

If the plan is implemented and it is perceived as not being successful, this could lead to either of two widely divergent results once the Iranian oil production hiatus is ended:

1. A renewed and intensified spirit of cooperation both within the IEA and among nations in general to deal with the growing world energy problem or,
2. Fragmentation of the world community as individual nations move to shore up their individual positions in the next decade when oil demand may persistently exceed supply and reasonable prices.

On the other hand, if the plan is not activated and it is generally known that some nations experienced

shortages that should have warranted activation, it may well be viewed by all as a demonstration of a lack of confidence in the IEA system. This could undermine any deterrent effects that the IEA program has for future politically motivated shortages. Non-activation would also have the tendency to allow member nations to participate in a price war of sorts while competing for supplies.



CHAPTER IV

EFFECTS ON THE U.S. ECONOMY

The Iranian shortfall can adversely affect the domestic economy by causing oil price increases and physical shortages of oil that prevent economic activity from being carried out. We deal with the price effects here. There also are a number of ways government can avoid serious physical shortages through conservation, fuel switching, and allocation to smooth out severe local or regional shortages. We discuss the specific measures government can take in these areas in the next section of this report.

Oil Prices

No one knows precisely how the Iranian export cutback will change world oil prices. Neither the length of the cutoff nor the reactions of the other exporters, the consuming nations, or the international oil companies are known. Nevertheless, we can say some things which may throw some light on the topic. First of all, the longer the cutoff continues, the higher prices are likely to go. As we have pointed out, world oil demand normally rises and so the gap between supply and demand will grow if other oil exporters choose to hold to their present output ceilings. Abu Dhabi and Qatar have raised prices by 7 percent on their total production, while Saudi Arabia has increased prices on the 1 million barrels per day of additional output they have authorized. Other nations are likely to raise prices at least temporarily on at least some of their output as time passes, especially if spot market prices continue to climb.

Spot market prices have risen around \$10.50 per barrel since October 1978 and are now about \$23 per barrel. While the proportion of world oil supply traded on the spot market is normally small, about 5 percent, there is a great temptation for traders to divert as much oil to this market as possible to take advantage of the price differential. As spot market volumes rise, the average price of all oil will also rise. Whatever increases do happen will, of course, be piled on top of the considerable price increase already scheduled for 1979. Our rough estimate is, if the cutoff continues throughout the year, that prices will rise an additional 7 percent, or \$1 more per

barrel.* This estimate is based on price increases already announced or likely in the immediate future. In 1980 the premium may increase to around \$1.60. OPEC price policies are extremely volatile. As of February 27, Venezuela and Kuwait have raised prices on some oil. The price increase movement seems to be spreading and final prices may eventually be considerably higher than we hypothesized. At the time it was made, our hypothesis seemed, if anything, to see higher prices than others were predicting.

Macroeconomic Effects

We calculated that such price increases would filter through the economy raising costs, prices, and cutting peoples' real incomes. We used the Data Resources, Inc. quarterly econometric model to chart the effects these price increases would have.

The simulations reflect what would happen to the economy if the Iranian cutoff continued through 1980. If the cutoff ended by 1980, the results for 1979 would still be applicable. The results are summarized in Table 5.

Such losses are serious, especially when seen in the present economic context of increasing inflation and probable growth slowdown. For example, the 1979 GNP loss (in current dollars) would come to more than \$160 for a family of four and in 1980 the loss would rise to nearly \$300. Unemployment would rise by 100,000 this year and another 100,000 next year.

The additions to inflation plus increased Federal deficits, higher trade deficits, and lost investment are disturbing because they can be mutually reinforcing. For example, higher Federal deficits can contribute to inflation. Lower investment means low productivity growth which makes scheduled wage increases more inflationary. A worse trade balance may lower the value of the dollar internationally, thereby raising import prices and contributing further to inflation.

*/The increase scheduled for all 1979 was 14.5 percent. When spread over the year, average prices would have increased 10 percent. Our scenario incorporates a 17 (10 + 7) percent increase.

TABLE 5

Economic Effects of the Iranian Oil Cutoff

	<u>1979</u>	<u>1980</u>
GNP Loss (billions 1978 \$)	-8.5	-14.0
Additional Inflation (higher rate of increase in the consumer price index)	.7	.4
Additional Unemployment (increase in the unemployment rate)	.1	.2
Additions to the Federal Deficit (billions of dollars)	.5	2.5
Additions to the Trade Deficit (billions of dollars)	.8	.5
Lost Investment (billions of dollars)	-2.3	-6.0

Source: Simulation output by Data Resources, Inc. for the General Accounting Office.

These other effects can, under certain circumstances, feed on each other. Thus, the Iranian oil cutoff definitely will contribute to our present economic malaise and may worsen economic performance in the future.

If the IEP was individually triggered, prices should not vary much from our scenario because total world oil output would be unchanged and U.S. domestic oil would still be under price control. Government actions to restrain demand in the U.S., however, would have to be a bit stronger.

Oil consumption will drop about 200 MBD from what it would have been by lowering demand directly as people cut back in the face of higher prices and also by cutting economic growth. Thus, the economic facts of lower growth and higher prices "eat up" 40 percent of our shortfall. The remaining 300 MBD have to be made up through conservation and other measures discussed in Chapter V of this report. Chapter V also addresses the important question of whether demand restraint actions should be implemented to generate slack in the world oil market and thereby mitigate further price increases.

CHAPTER V

GOVERNMENT OPTIONS

Several GAO studies* since the 1973 oil embargo have documented the Department of Energy's lack of progress in developing a capability to deal with crude oil supply disruptions. A particular failure on DOE's part was its tardiness in submitting mandatory conservation and standby gasoline rationing plans. While these plans should have been presented to the Congress for approval in June, 1976, the Department has only just submitted them. Furthermore, the Department's plans for dealing with the current shortfall have not yet been finalized.

GAO has consistently supported a more vigorous conservation program. The Iranian oil shortfall, with its attendant price effects, has made the need for such a program even clearer. We need to curb demand, both to get our energy balance back in physical terms and to take pressure off world oil prices.

The Department of Energy has a large number of programs either in place or nearly ready which could be used to deal with the present Iranian shortfall or any future supply disruption. The programs are:

- voluntary oil conservation
- mandatory oil conservation
- the Strategic Petroleum Reserve

*/Letter report to Senator Henry Jackson on FEA's Coal Conversion Program, (EMD-77-66; 9/16/77); More Attention Should Be Paid to Making the U.S. Less Vulnerable to Foreign Oil Price and Supply Decisions, (EMD-78-24; 1/3/78); Letter report to the Secretary of Energy on DOE's Actions to Develop Contingency Plans, (EMD-78-59; 4/27/78); The Federal Government Should Establish and Meet Energy Conservation Goals, (EMD-78-38; 6/30/78); Improved Energy Contingency Planning is Needed to Manage Future Energy Shortages More Effectively, (EMD-78-106; 10/10/78); Letter Report to Congress on Energy Conservation Programs and Policies Implemented Since the 1973 Oil Embargo, (EMD-79-43; 2/13/79).

--fuel switching, and

--gasoline rationing

While each of these programs has the potential to conserve a considerable amount of oil, many of them have associated economic costs. The oil savings of each must be weighed against the costs when considering implementation. Furthermore, some of these programs have particular implementation problems which we discuss below.

If the Iranian shortfall continues, during the coming months we will be "short" about 300 MBD in the sense that higher prices and reduced economic activity will lower oil demand about 200 MBD. The recent decision by IEA members to voluntarily reduce consumption by 5 percent will require the U.S. to reduce its consumption by about 900 MBD. It is apparent that some conservation actions will be needed to comply with this new IEA agreement.

Two factors suggest, however, that we should thoroughly analyze the tradeoffs in implementing additional programs--particularly the more disruptive ones. First, marginal changes in fuel switching including substituting natural gas for oil, and more voluntary conservation will all help to reduce oil demand. Furthermore--and admittedly this factor is highly uncertain--Iran may well begin to export significant amounts of oil in the near future. Second, except for the Strategic Petroleum Reserve, many of DOE's oil demand restraint programs will take some time to bear results and may not be helpful in the near term. Many of the results predicted for these programs are questionable. Finally, the more stringent mandatory programs, such as gasoline rationing, will cause considerable economic harm and should only be implemented under emergency conditions.

As unprepared as DOE is to implement these programs, some of them may have to be activated to combat the oil price increases. These price increases appear to have the greatest potential for doing grave damage, both to the U.S. and to others. Tight markets are causing these price increases in the contract and spot markets and continuing supply scarcity will encourage higher prices and economic setbacks which are more serious than those analyzed in Chapter IV.

There is a direct connection between demand constraint in this country and world oil prices over the long term. We buy about one-fourth of the world's internationally traded oil. An effective program of demand

restraint will go a long way toward creating slack in world markets which would lower the rate of price increases.

There is clearly room for considerable conservation action. Eliminating the weaknesses in DOE's programs as quickly as possible and then putting at least some of them into effect will help remove the upward pressure on prices.

Voluntary Conservation

The Department of Energy's first line of defense against an oil import reduction is voluntary conservation. DOE feels it can offset a considerable amount or possibly even the entire shortfall through voluntary conservation in buildings, and in the industrial, transportation, and public sectors. The Department proposes to promote these programs through press releases, energy saving tips, Presidential appeals, advertising on radio and television, and a letterwriting campaign to enlist the cooperation of governors, local officials and business leaders. The Department expects to save anywhere from 250 to 700 MBD depending on the degree of participation. Table 6 presents DOE's projected savings under the various programs assuming high, medium and low participation.

Public Sector

DOE expects Federal, State, and local governments to cut their energy use by 10 percent. Depending on other assumptions savings may range from 9 to 39 MBD, so this can hardly be counted as a major contribution. Federal agencies have not developed or implemented energy conservation plans nearly to the extent mandated by the Congress.

Questions exist regarding DOE's assumptions of State and local government fuel savings. DOE projects that savings would be four times as much as Federal because State and local government employment is four times larger. However, they then reduce the savings to twice as great because this arbitrary reduction seemed more realistic. The Department should analyze how different energy use patterns of States and localities are from the Federal uses to derive a more realistic estimate of potential savings. For example, is it reasonable to expect State and local government to cut energy use significantly in police and fire departments? In hospitals? In schools? If DOE had an analysis of those State and local

TABLE 6

Estimated Savings for Voluntary Options
(Savings figures are in barrels of oil per day)

	<u>High</u>	<u>Medium</u>	<u>Low</u>
PUBLIC SECTOR			
Federal	13,000	6,500	3,000
State and local	<u>26,000</u>	<u>13,000</u>	<u>6,000</u>
TOTAL	<u>39,000</u>	<u>19,500</u>	<u>9,000</u>
BUILDINGS SECTOR			
Residential temp. reduction	30,000	15,000	6,000
Commercial temp. reduction	15,000	7,500	3,000
Redesign school term	30,000	20,000	10,000
Reduce commercial hours	<u>10,000</u>	<u>5,000</u>	<u>2,000</u>
TOTAL	<u>85,000</u>	<u>47,500</u>	<u>21,000</u>
INDUSTRIAL SECTOR	<u>30,000</u>	<u>30,000</u>	<u>30,000</u>
TRANSPORTATION SECTOR			
Reduce gasoline consumption in personal driving	200,000	200,000	80,000
Reduce gasoline consumption in home-to-work trips	250,000	250,000	100,000
Car and truck maintenance	70,000	30,000	14,000
Speed limit enforcement	10,000	5,000	2,000
Reduction in airlines use of jet fuel	<u>32,500</u>	<u>32,500</u>	<u>13,000</u>
TOTAL	<u>562,500</u>	<u>517,500</u>	<u>209,000</u>
TOTAL ALL SECTORS	<u>716,500</u>	<u>614,500</u>	<u>269,000</u>

Source: U.S. Department of Energy

government activities which are not involved in health, safety, and education it would have a more realistic basis for projecting oil savings.

Buildings

DOE proposes four actions to reduce oil use in buildings. They are:

- Reduce residential temperature to 65 during the day and 55 at night.
- Reduce commercial building temperatures by the same amounts.
- Reduce hours in commercial establishments by 15 percent.
- Close schools for one to three months during the peak heating season.

These programs could save between 21 and 85 MBD.

DOE's expectation that homeowners would reduce their thermostat setting by these amounts--especially the chilly night time 55--may or may not be well-founded.

The estimates for commercial indoor temperature reduction seem even less realistic. Many of these establishments (restaurants, hotels, theaters, retail stores) must maintain comfortable temperatures or be placed at a perceived disadvantage to their competitors. The same argument holds for reducing hours. While some establishments may not fear losing business to competitors, any store which serves a clientele that shops only at certain hours because of work or other reasons would be very reluctant to take the risk that those customers would shop at other times.

The plan to ask school systems to radically redesign their school terms with all the attendant disruption that would follow seems unrealistic. DOE feels that 30 percent of all schools would shut down for 1 to 3 months during the winter. Of course, the inconvenience to teachers, students, and parents would be very great, and DOE seems to believe that if schools shut down every gallon of oil not burned in those buildings would be a gallon saved. This seems overly optimistic. Homes which were unoccupied and unheated while parents worked and children were in school would now be heated during the day. Teachers would have to find other things to do, and surely most

of those activities would involve consuming energy.

Industry

DOE expects industrial use of oil to drop by only 1 percent. This 30 MBD is small, but the assumed participation rate is so low that it may very well be achieved. More attention might profitably be paid to ways of promoting higher savings in this area since industry accounts for nearly 20 percent of all oil use.

Transportation

Most people identify oil use with travel and DOE expects 80 percent of savings (200 to 562 MBD) to come from transportation. The Department plans to:

- Reduce personal gasoline use by 10 percent
- Reduce commuter gasoline use
- Enforce the 55 mph speed limit more strictly
- Increase car and truck maintenance
- Cut back on airline use of jet fuel by 10 percent

The first three programs account for nearly 3/4 of projected savings. The largest saving accrues from less gasoline used for commuting (100 to 200 MBD) and these savings depend on increasing public transit use. Transit authorities could have to expand their peak carrying capacities considerably, but DOE apparently has not examined whether transit systems presently have the trains and buses necessary to expand peak service. Also, increasing use of buses will mean increased oil use and DOE does not seem to have taken this into account.

Increased car and truck maintenance can be labor or money intensive. For example, increasing tire pressures to maximum safe levels are easy and inexpensive even if it makes for a rough ride. Tune-ups and similar repairs which improve gasoline mileage are quite costly. DOE does not seem to have broken down these very different kinds of desirable consumer behaviors and analyzed them separately. We feel that would be appropriate since it might take very different kinds of campaigns to get drivers to participate in the different programs.

There is a question as to whether much oil would be saved by stricter enforcement of the 55 mph speed limit.

DOE has not analyzed whether the states and localities have the necessary personnel to significantly step up enforcement. Furthermore, a few States have indicated a desire to repeal the 55 mph limit.

A separate problem with DOE's oil savings in the transportation sector is that some seem to be counted twice. Much discretionary driving is done on highways and presumably much of it is done above 55 mph. Thus, cutting unnecessary personal driving would probably reduce the savings from stricter speed limit enforcement.

A final issue is how long we can expect people to inconvenience themselves in response to public appeals. DOE expects a response rate of about 15 percent, but does not know for how long. There may also be some relationship between the amount and length of cooperation and the number of times people are asked to respond. Many appeals may desensitize them and when a deeper crisis comes along the response may not be as great.

It is not clear to us whether DOE's programs will save more or less oil than projected, although we would hazard the guess that substantially less is more likely than substantially more.

Mandatory Conservation

The Department of Energy presented a Mandatory Conservation Program as required by Title II of the Energy Policy and Conservation Act (EPCA) to the Congress for its approval on February 26, 1979. By law, the Program was to have been presented in June, 1976. Adopted mandatory conservation measures can be implemented at the President's discretion during any severe energy supply disruption or to fulfill U.S. obligations under the International Energy Program. The proposed program consists of the following three measures:

- Weekend gasoline sales restrictions
- Building temperature reductions
- Advertising lighting restrictions

DOE staff estimate the total oil savings from these measures to be 608 MBD, significantly above the 300-500 MBD shortfall. To implement and enforce these measures would cost the Federal Government \$5 million and State and local governments, \$17 million.

Although many of the details of DOE's mandatory

conservation program are not known at this time, it appears that mandatory conservation has the potential to eliminate or substantially reduce the shortfall. However, the extent to which these measures are enforceable or will achieve the level of oil savings DOE predicts is unclear. Further, some mandatory conservation measures could damage certain industries.

Weekend Gasoline Sales Restrictions

DOE staff predict that oil savings of 240 MBD will be achieved by prohibiting gasoline sales to automobiles between noon Friday and midnight Sunday. DOE staff base savings estimates on the assumptions that all trips over 300 miles and no shorter trips are curtailed. The effects on the tourism and automobile industries could be serious. Vehicles exempt from the prohibition such as taxis, heavy trucks, and emergency vehicles could also find it difficult to obtain fuel since gasoline stations would be closed.

Building Temperature Restrictions

DOE expects that setting thermostats in public and commercial buildings at no more than 65 degrees for heating and no less than 80 degrees for cooling will save 364 MBD. While DOE reduced total savings by assuming that buildings were starting from an already lowered temperature of 68 degrees, 100 percent compliance was assumed. Both of these rather unrealistic assumptions may have opposite effects on savings so the final estimate may be reasonable. However, such crude assumptions certainly threaten the accuracy of estimated savings.

This measure is also difficult to enforce and oil savings will decrease with the increased likelihood of cheating. While most businesses have an economic incentive to reduce fuel costs, those who choose to cheat could do so with little fear of getting caught. DOE's proposed measure calls for only 39 Federal and 278 State and local employees to monitor the Nation's buildings.

Advertising Lighting Restrictions

Extinguishing illuminated advertising signs appears to be primarily a symbolic gesture to raise the nation's "energy emergency" consciousness. DOE staff have recently estimated oil savings from this measure to be 4 mbd. DOE staff further indicated that on-premise signs which identify a place of business would be exempt from this restriction. This mitigates much of the adverse impact this measure could have on hotels, restaurants, etc. This measure may

indeed have some symbolic value, but it is unfortunate that five years after the embargo we are still dealing in symbols.

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In summary, DOE and State and local governments may find it difficult to enforce some of the three proposed measures. DOE lacks baseline data, cheating is easy and few enforcement personnel are committed.

Oil savings may not be as great as DOE suggests. If voluntary conservation is effective, certain savings may be double counted. For example, both the voluntary and mandatory programs call for reducing commercial building temperatures and discretionary gasoline use.

Finally, many of these conservation measures concentrate their adverse effects on certain industries. The automobile, tourism, utility, hotel and restaurant industries would be more significantly hurt than most others.

In our letter report to Congress on "Energy Conservation Programs and Policies Implemented since the 1973 Oil Embargo", dated February 13, 1979 (EMD-79-34), we noted a lack of specific planning and direction by the Government in energy conservation. We noted that the three overriding problems concerning energy conservation are:

- The lack of consistent, specific planning which clearly identifies what contribution energy conservation is to make in the overall energy plan.
- The lack of an aggressive, coordinated effort to conserve energy in Federal operations and facilities.
- The failure of the Administration to promptly develop, and have approved by Congress, emergency energy conservation and gasoline rationing plans.

Strategic Petroleum Reserve

One suggestion to help meet our oil shortfall is to use the Strategic Petroleum Reserve, either directly drawing it down or by diverting oil under contract but not yet delivered to the general economy. DOE is actively examining both possibilities, especially the latter, but neither hold much promise for easing our current situation. The SPR is scheduled to receive approximately 300 MBD in March. March's deliveries could probably be diverted if actions were taken immediately. April deliveries, however, are currently slated at only 78 MBD. This is because DOE has not yet made new contracts for April and subsequent months. DOE is now soliciting bids for the second quarter, but as of this writing has not made a decision whether to purchase or not. If no oil is offered or offered only at high prices, DOE may simply defer purchases. In any case, there is little oil already "in the pipeline" which can be diverted.

We could also use the more than 70 million barrels already in the SPR. Consuming this oil at a rate of 300 MBD it would last more than 7 months. Ignoring the facts that DOE does not intend to submit the necessary SPR oil distribution plan for Congressional approval until early this summer and that DOE does not currently have the physical capability to retrieve and distribute the oil,* we question whether using the SPR in the current situation would be appropriate. Of course, any oil used now would have to be made up later, and we do not know what future supply and price conditions will be. More importantly, the SPR is intended for true emergencies, and our analysis leads us to believe that the present and foreseeable problems created by the Iranian oil cutoff are not serious enough to warrant using SPR oil.

*/DOE states that temporary drawdown facilities could be installed in 45 to 60 days after obtaining environmental waivers, permits and sole source authority for materials, equipment, and services procurement. Permanent drawdown facilities are not scheduled to be in place until this coming fall. Temporary drawdown facilities would have a capacity of 200 MBD for the first 60 days and 250 MBD thereafter.

Fuel Switching

One program which has long term potential to alleviate oil import dependence is fuel switching. The DOE and its predecessor agencies have been promoting coal conversion since 1974 and continue to push coal as a preferred fuel although there has been little progress to date. Recently, DOE has begun urging utilities and industries who switched from gas to oil to switch back. The reason for this is a temporary surplus of producible gas estimated to be about 1 TCF per year over the next 2-4 years. Many previous gas users maintain a gas burning capability and DOE estimates that up to 500 MBD of oil could be saved if the available gas were fully utilized.

Neither fuel switching program was conceived with the Iranian shortfall in mind, and DOE staff does not expect noticeable oil to gas conversions until late summer or early fall of this year. That schedule assumes the considerable legal/regulatory impediments which were erected during times of gas shortage can be overcome quickly. Thus, the resulting oil savings may well come too late to be of much help in the present shortfall and they may not last long enough to be much help in the future.

The oil to coal program could save up to 140 MBD if most installations having a dual fuel burning capability were converted. The economic and especially environmental hurdles which have made progress in this area so slow in the past, however, are still operative. With this in mind, DOE estimates that only 35 MBD could actually be displaced. While we cannot directly comment on DOE's assumption, it seems to us that removing regulatory impediments to coal conversion would be harder than gas conversion. Since the dividends in oil saved would be much smaller and the needed actions could be very time consuming, we should not expect any near-term help from oil to coal conversions.

Another kind of "fuel switching" is substituting electric power produced from coal, nuclear, gas, or hydroelectric sources for power generated from oil. Such power can be distributed ("wheeled") from utilities which do not use oil to those that do. DOE estimates the total practicable oil savings from power wheeling at 100 MBD. One unresolved question, however, is the cost of wheeled power. During the recent coal strike, some coal short utilities were forced to purchase power from others. This power was considered to be peak load and the final customers wound up paying very high bills. If

wheeling is ever ordered by DOE to deal with an oil shortage, special attention should be given to equitable cost sharing.

Gasoline Rationing

The most thoroughgoing form of allocation--rationing--extends all the way to the end user. Rationing would, of course, "solve" our problem since the total amount of gasoline sold would be strictly limited by the number of coupons issued. Shortages of other products could also be made up by producing more of them and reducing gasoline supply accordingly.

DOE has recently submitted its standby gasoline rationing plan to Congress, although they have not requested implementation. Our evaluation is that the social and economic costs of gasoline rationing outweigh the benefit of administratively balancing the supply and demand gap stemming from the Iranian cutoff.

The economic costs are considerable. The Department of Energy estimates that the program would need \$1.6 billion operating funds annually.

Another problem is the time needed to activate the plan. First, Congress must approve the plan. Then, the President would have to call for its implementation. Congress would have 15 days to disapprove the President's recommendation. If not disapproved, the Administration estimates that it could have the plan operating in another 45 days.

The most basic problem of rationing is the inconvenience and loss of freedom it imposes. The inconvenience of dealing with the bureaucracy, handling coupons, the inevitable extra paper work would be a considerable burden. Furthermore, the proposal for a "white market" in excess coupons could well mean that low income drivers who need gasoline for commuting or other important purposes could be priced out of the market. Rationing is the type of program that should be ordered only in the most critical emergencies. There may well come a time and a crisis where gasoline rationing is needed, but the immediate problems caused by the Iranian cutoff are not such a crisis.

A Final Thought

In the final analysis, it appears that there are sufficient options available to deal with the Iranian shortfall--at least from a volume standpoint. Prices may be another matter however. The effect of substantial price increases could be quite damaging. Another disturbing factor, which has not been widely recognized, is that the Iranian situation further concentrates the free world's oil supply. While we may be able to manage with the loss of Iranian production, there is virtually no more slack left in the system. The consequences of losing another major source on top of Iran's would be very serious. The loss of the major supplier, Saudi Arabia, which would cut the free world's oil supply by 30 percent, would be disastrous.

This underscores the importance of action in three areas where GAO has done previous work and made recommendations. First, the Government needs to get its conservation act together. There is no reason to believe that the world is not going to continue to experience periods of tight supply and upward pressure on prices. The time simply is here to bite the bullet on conservation. Secondly, we should encourage more exploration and development from areas outside of OPEC. In a report to the Congress dated January 3, 1978, entitled, "More Attention Should Be Paid to Making the U.S. Less Vulnerable to Foreign Oil Price and Supply Decisions", (EMD-78-24), we recommended that the Departments of State and Energy seriously develop plans and submit the proposed initiatives to the Congress for consideration. Both agencies have neglected to take such actions and we are aware of no effort underway to do so. Lastly, national energy policy should be more focused to achieve an orderly transition to an economy based upon alternative sources of energy. We urgently need to move more rapidly to a renewable energy resource base and adjust the emphasis of our programs accordingly.

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Honorable Elmer B. Staats
Comptroller General of the U.S.
General Accounting Office
441 G Street
Washington, D.C. 20548

Dear Mr. Staats:

The continuing crisis in Iran has heightened the industrialized world's concern over the amount of oil which will be available and the security of that supply. We share that concern and would like the General Accounting Office to analyze the economic and energy effects the Iranian situation may have on the U.S. and other industrialized countries. Because of the urgency of the situation, we would like to get your analysis, based on your experience and presently available data within two weeks of the date of this letter.

There are several questions we would like answered, each of which implies several sub-questions.

How will the halt in Iranian oil production affect U.S. oil supply? Specifically:

--How large is the present import shortfall and what would it become if the cut-off continues for a year or so?

--How much of the shortfall may be made up by other oil exporters?

--What specific types of crude and products would be lost?

What are the implications if the International Energy Agency oil sharing agreement is triggered? Specifically:

Honorable Elmer B. Staats
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--How likely is it that the IEA oil sharing agreement will be triggered either by one or two countries or by the members as a whole?

--If the agreement is activated, what would be the major implications for U.S. oil supply?

--If the agreement is activated, what would be the major international implications?

What general effects will the Iranian import shortfall have on the U.S. economy? We are also particularly interested in:

--How may oil prices be affected?

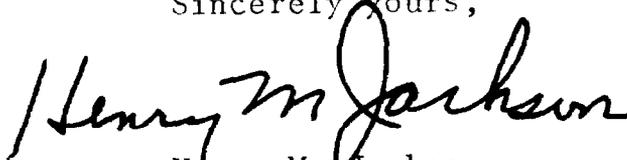
--What macroeconomic effects, if any, can we expect?

--Which consumers (industrial, residential, etc.) and areas of the Nation will be most heavily affected?

What government actions can be taken to mitigate the deleterious impacts of an import shortfall? We would particularly like to know what major actions such as allocation, gasoline rationing, mandatory conservation and fuel switching can be implemented. In addition, we would like to know what are the benefits of such actions and when will they be realized.

Your expeditious response would be greatly appreciated.

Sincerely yours,



Henry M. Jackson
Chairman

HMJ/rgd

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